STATEMENT OF BASIS

Applicant:	City of Mitchell
Permit Number:	SD0023361
Contact Person:	Ken Tracy, Mayor Jon Vermeulen, Wastewater Superintendent 612 North Main St. Mitchell, SD, 57301-2620
Phone:	(605) 995-8420 (city hall) (605) 995-8446 (wastewater superintendent)
Permit Type:	Major Municipal - Renewal

This document is intended to explain the basis for the requirements contained in the proposed Surface Water Discharge Permit. This document provides guidance to aid in complying with the permit regulations. This guidance is not a substitute for reading the proposed permit and understanding its requirements.

DESCRIPTION

The city of Mitchell operates a wastewater treatment facility (WWTF). The pretreatment portion of the plant along with the lab, administration offices, a small storage pond, and raw wastewater pumping station are located approximately one and one-half miles east of the city in the Northeast ¼ of Section 26, Township 103 North, Range 60 West, Hanson County, South Dakota (Latitude 43.697667°, Longitude -97.992417°, Navigational Quality GPS).

The mechanical plant, land application equipment, and holding ponds are located about three miles southeast of the city. Cells 3, 4, and 5 and the mechanical plant are located in the Northeast ¼ of Section 1, Township 102 North, Range 60 West, Davison County, South Dakota. Cells 6 and 7 are located in the Northwest ¼ of Section 6, Township 102, North, Range 59 West, Hanson County, South Dakota (Latitude 43.669861º, Longitude -97.967944º-Navigational Quality GPS, centroid of the facility). The system serves a population of 15,254 (2010 census) in addition to several industrial facilities, which results in a population equivalent of 24,440 (last inspection report).

Several significant industrial users discharge to the WWTF. Trail King Industries, Twin City Fan Industries, Quality Woods, and Performance Pet Products (American Food Group) account for approximately 1.5% of the total flow to the WWTF and are subject to National Pretreatment Standards (40 CFR Part 403). The city has an approved pretreatment program and issues its own industrial pretreatment permits. The WWTF began operation in 1978, with upgrades in 1997 and 2007, and was designed for an average flow of 2.4 million gallons per day (MGD) and a peak flow of 5.0 MGD.

Fourteen lift stations located throughout the city pump wastewater through the collection system to the raw sewage pumping station and plant headworks. The wastewater enters the plant through a 12-inch Parshall flume and passes through either a mechanical bar screen or can be diverted to

a manually raked bar screen. After screening, the wastewater flows through a cyclone type aerated grit chamber. Flow from the grit chamber goes to a raw wastewater wetwell that is connected to an old clarifier and digester system, which now serves as a flow equalization basin. The flow equalization basin has been equipped with aeration to keep the wastewater mixed. The basin is equipped with a manual bypass gate (Outfall 003), which allows the WWTF to bypass wastewater directly to Dry Run Creek in emergency situations.

The wastewater in the raw sewage pumping station wetwell and flow equalization basin is periodically pumped about one and a half miles south east to the secondary mechanical treatment process and holding pond system. The secondary treatment stage consists of two extended aeration activated sludge basins (Cells 1 and 2) which are operated in parallel. The two basins each have a surface area of 0.9 acres, a depth of 16 feet and contain two fixed-platform, slow-speed, surface aerators. Wastewater mixed liquor then flows into two 50-foot diameter clarifiers.

The sludge from the clarifiers is returned to the aeration activated sludge basins Cells 1 and 2 or wasted to Cells 3 and 4. The effluent from the clarifiers flows into Cells 3 and 4 which are operated in parallel. These cells are each 26.4 acres and are 15 feet deep. The effective storage volume is 97 million gallons. Cells 3 and 4 can be aerated with portable aerators if necessary.

The effluent from Cells 3 and 4 flows into Cells 5, 6, and 7, which are operated in series and are not aerated. Cell 5 is 22.5 acres, has a depth of 11 feet and an effective storage volume of 94 million gallons. Cell 6 is 35 acres, has a depth of 12 feet and an effective storage volume of 109 million gallons. Cell 7 is 35.7 acres, has a depth of 18 feet and an effective storage volume of 174 million gallons. Each cell may be isolated by a valve control structure.

The effluent can be discharged from Cell 7 (Outfall 001) to the James River or can be land applied (Outfall 002).

The city of Mitchell is also responsible for a stabilization pond located adjacent to the wastewater treatment plant office site and raw wastewater pumping station. This pond receives commercial waste and domestic septage and has been designated as Outfall 004.

RECEIVING WATERS

Any discharge from Outfall 001 will enter the James River, which is classified by the South Dakota Surface Water Quality Standards (SDSWQS), Administrative Rules of South Dakota (ARSD), Sections 74:51:03:01 and 74:51:03:20 for the following beneficial uses:

(5) Warmwater semipermanent fish life propagation waters;
(8) Limited-contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters; and
(10) Irrigation waters.

Any discharge from Outfall 003 or 004 will enter Dry Run Creek and flow about one and a half miles before entering the James River. Dry Run Creek is classified by the SDSWQS, ARSD Section 74:51:03:01 for the following beneficial uses:

(9) Fish and wildlife propagation, recreation, and stock watering waters; and
(10) Irrigation waters.

No discharge is allowed from Outfalls 003 or 004. Because no discharge is allowed into Dry Run Creek, the SDSWQS (ARSD Section 74:51:01:02.01) requirement that an analysis of the receiving stream be conducted to determine whether the waterbody deserves a higher beneficial use designation is not required.

ANTIDEGRADATION

South Dakota Department of Environment and Natural Resources (SDDENR) has fulfilled the antidegradation review requirements for this permit. In accordance with South Dakota's Antidegradation Implementation Procedure and the SDSWQS, no further review is required. The results of SDDENR's review are included in Attachment 1.

MONITORING DATA

The city of Mitchell has been submitting Discharge Monitoring Reports (DMRs) as required under the current permit. As shown in Attachment 2, this facility has had three violations of pH and one violations of Total Suspended Solids (TSS) from Outfall 001 during the current permit cycle. However, these violations seem to be isolated incidences and do not reflect the overall treatment performance of this facility. No future violations are expected.

The facility also had three fecal coliform violations from Outfall 002R. The facility used to have a fecal coliform limit for any water land applied using Outfall 002R. On October 1, 2006, a permit modification went into effect eliminating the fecal coliform limit due to the development of a land application best management plan. The proposed permit will require an updated land application best management plan be submitted to and approved by SDDENR. No discharge was reported for the months not included in the table.

INSPECTIONS

Personnel from SDDENR conducted a Compliance Inspection of the city of Mitchell's wastewater treatment facility on September 29, 2011. The following comments and corrective actions were made:

COMMENTS	REQUIRED CORRECTIVE ACTIONS
A value was reported in the 30-Day Geometric Mean Average column of the June 2011 Discharge Monitoring Report (DMR).	Five or more samples must be taken before the 30 Day Geometric Mean can be calculated.

COMMENTS	REQUIRED CORRECTIVE ACTIONS
The Frequency of Analysis was reported incorrectly on the June 2011 DMR.	Three samples are to be taken the first week of discharge and one each following week. The first week of this discharge occurred in May 2011. Therefore, the Flow Rate should have been reported as 4/7. The other parameters should have been reported as 1/7.
There have been numerous overflows and bypasses since the last inspection.	The city must continue its efforts to identify sources of infiltration and inflow and upgrade the collection system. Continue submitting annual reports of the city's progress detailing the steps taken to improve the system and the city's plans for the next 12 months.

The following comments and corrective actions are ***recommended*** and are items that will improve the operation of your facility.

COMMENTS	RECOMMENDED CORRECTIVE ACTIONS
The current sewer use fees may be inadequate	The department recommends the town review its wastewater rates and give serious consideration to raising them. Several communities are facing upgrades, rehabilitation, or new construction. The costs of these projects are typically very large and cannot be accomplished without the community leaders having the foresight to set appropriate wastewater rates to cover these costs as well as the operation and maintenance costs. To avoid a large one-time increase, the community may want to consider annual increases to the sewer rates over a period of several years. If your community is confronting a large project, you may wish to contact your local planning district to discuss appropriate rates and the available funding sources for your project.
Erosion is occurring in Cell #6.	The City should continue with its plans to correct the erosion problem.

EFFLUENT LIMITS

Outfall 001 – Interim Effluent Limits

SDDENR is required by EPA and the federal Clean Water Act to review and revise its surface water quality standards at least every three years. On March 11, 2009, the South Dakota Board of Water Management approved SDDENR's latest triennial review of the South Dakota Surface Water Quality Standards. As part of this review, SDDENR added surface water quality standards for *Escherichia coli* (*E. coli*). ARSD Section 74:51:01:51 includes numeric criteria for both fecal coliform and *E. coli*. SDDENR intends to phase in the implementation of the *E. coli* standards.

During the reissuance of surface water discharge permits, permittees that are currently required to meet fecal coliform limits will be given time to meet the new *E. coli* limits. Therefore, interim limits for fecal coliform will be initially included in the proposed permit, with a requirement to meet the new *E. coli* limits by May 1, 2014.

Effective immediately and lasting through **April 30, 2014**, the permittee shall comply with the interim effluent limits below. During any discharge, the permittee shall comply with the effluent limits specified below, which are based on the Secondary Treatment Standards (ARSD Chapter 74:52:06), the SDSWQS, Best Professional Judgment (BPJ), and the current permit limits.

Outfall 001A – Any discharge from Cell #7 into the James River (Latitude 43.678044°, Longitude -97.954189°, Navigational Quality GPS).

1. The Five-Day Biochemical Oxygen Demand (BOD_5) concentration shall not exceed 30 mg/L (30-day average) or 45 mg/L (7-day average). These limits are based on the Secondary Treatment Standards.

2. The Total Suspended Solids (TSS) concentration shall not exceed 30 mg/L (30-day average) or 45 mg/L (7-day average). These limits are based on Secondary Treatment Standards.

3. The pH shall not be less than 6.5 standard units or greater than 9.0 standard units in any single analysis and/or measurement. These limits are based on the warmwater semipermanent fish life propagation waters classification of the James River, and the SDSWQS (ARSD Section 74:51:01:48).

   Note: SDDENR specifies that pH analyses are to be conducted within 15 minutes of sample collection with a pH meter. Therefore, the permittee must have the ability to conduct onsite pH analyses. The pH meter used must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

4. Fecal Coliform organisms from May 1 to September 30 shall not exceed a concentration of 1,000 per 100 milliliters as a geometric mean based on a minimum of five samples obtained

during separate 24-hour periods for any 30-day period. *This limit is applicable only if five or more samples are taken and is only effective from May 1 to September 30.*

In addition, fecal coliform organisms shall not exceed 2,000 per 100 milliliters in any one sample from May 1 to September 30. These limits are based on the limited contact recreation waters classification of the James River and the SDSWQS (ARSD Section 74:51:01:51).

5. The ammonia-nitrogen concentration shall not exceed the limits specified in the table below. These limits are based on the warmwater semipermanent fish life propagation waters classification of the James River, the SDSWQS (ARSD Section 74:51:01:48), the current permit limits, and BPJ. As shown below, the city's effluent limits vary with the stream flow in the James River. See Attachment 3 for more detail.

Season	Ammonia Limit (as N)	
	30-Day Average (lb/day)	**Daily Maximum (lb/day)**
January 1 – January 31		
James River flow < 100 cfs	477	1,041
James River flow 100 cfs – 1000 cfs	917	2,091
James River flow >1000 cfs	1,849	3,239
February 1 – February 29		
James River flow < 100 cfs	477	1,041
James River flow 100 cfs – 1000 cfs	917	2,091
James River flow >1000 cfs	1,849	3,239
March 1 – March 30		
James River flow < 100 cfs	143	468
James River flow 100 cfs – 1000 cfs	309	1,015
James River flow >1000 cfs	604	2,523
April 1 – April 30		
James River flow < 100 cfs	143	468
James River flow 100 cfs – 1000 cfs	309	655
James River flow >1000 cfs	594	1,068
May 1 – May 31		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572
June 1 – June 30		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572
July 1 – July 31		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572

Season	Ammonia Limit (as N)	
	30-Day Average (lb/day)	Daily Maximum (lb/day)
August 1 – August 31		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572
September 1 – September 30		
James River flow < 100 cfs	107	201
James River flow 100 cfs – 1000 cfs	205	522
James River flow >1000 cfs	323	849
October 1 – October 31		
James River flow < 100 cfs	107	201
James River flow 100 cfs – 1000 cfs	205	522
James River flow >1000 cfs	323	849
November 1 – November 30		
James River flow < 100 cfs	115	201
James River flow 100 cfs – 1000 cfs	289	522
James River flow >1000 cfs	466	849
December 1 – December 31		
James River flow < 100 cfs	477	1,041
James River flow 100 cfs – 1000 cfs	917	2,091
James River flow >1000 cfs	1,849	3,239

The applicable 30-day average ammonia limit for each month shall be based on the 30-day average flow rate of the James River during that month. The applicable daily maximum limit shall be based on the flow rate of the James River on the day the sample was collected.

To calculate the effluent ammonia in pounds per day (lb/day), the following equation shall be used:

$$Ammonia\ \left(\frac{lb}{day}\right) = Ammonia\left(\frac{mg}{L}\right) \times Effluent\ Flow\ (MGD) \times 8.34$$

6. There shall be no Acute Toxicity, as measured by the Whole Effluent Toxicity test. This limit is based on the SDSWQS (ARSD Section 74:51:01:12, BPJ, and the current permit.

7. The Oil and Grease concentration shall not exceed 10 mg/L (in any grab sample) or impart a visible film or sheen to the surface of the water or the adjoining shorelines. This limit is based on the SDSWQS (ARSD Section 74:51:01:10) and current permit limits.

8. No chemicals, such as chlorine, shall be used without prior written permission. This limit is based on BPJ.

Effluent water temperature (°C), flow rate (million gallons per day, MGD), total flow (million gallons), duration of discharge (days), *E. coli* (no./100mL), instream flow of the James River (cubic feet per second, cfs), Molybdenum (mg/L), and the parameters listed in ARSD Sections 74:52:02:41(µg/L), 74:52:02:42 (mg/L), and 74:52:02:44 (µg/L) shall be monitored, but will not have a limit.

Outfall 001 – Final Effluent Limits

Effective **May 1, 2014**, and lasting through the life of the permit, the permittee shall comply with the final effluent limits below. During any discharge, the permittee shall comply with the effluent limits specified below which are based on the Secondary Treatment Standards (ARSD Chapter 74:52:06), the SDSWQS, BPJ, and the current permit limits.

Outfall 001A – Any discharge from Cell #7 into the James River (Latitude 43.678044°, Longitude -97.954189°, Navigational Quality GPS).

1. The Five-Day Biochemical Oxygen Demand (BOD_5) concentration shall not exceed 30 mg/L (30-day average) or 45 mg/L (7-day average). These limits are based on the Secondary Treatment Standards.

2. The Total Suspended Solids (TSS) concentration shall not exceed 30 mg/L (30-day average) or 45 mg/L (7-day average). These limits are based on Secondary Treatment Standards.

3. The pH shall not be less than 6.5 standard units or greater than 9.0 standard units in any single analysis and/or measurement. These limits are based on the warmwater semipermanent fish life propagation waters classification of the James River, and the SDSWQS (ARSD Section 74:51:01:48).

   Note: SDDENR specifies that pH analyses are to be conducted within 15 minutes of sample collection with a pH meter. Therefore, the permittee must have the ability to conduct onsite pH analyses. The pH meter used must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

4. The *Escherichia coli* (*E. coli*) organisms shall not exceed a concentration of 630 per 100 milliliters as a geometric mean based on a minimum of five samples obtained during separate 24-hour periods for any 30-day period. *This limit is only applicable if five or more samples are taken and is only effective from May 1 to September 30.*

   In addition, the *E. coli* organisms shall not exceed 1,178 per 100 milliliters in any one sample from May 1 to September 30. These limits are based on the limited-contact recreation beneficial use classification of the James River and the SDSWQS (ARSD Section 74:51:01:51).

5. The ammonia-nitrogen concentration shall not exceed the limits specified in the table below. These limits are based on the warmwater semipermanent fish life propagation waters classification of the James River, the SDSWQS (ARSD Section 74:51:01:48), the current permit limits, and BPJ. See Attachment 3 for more detail.

Season	Ammonia Limit (as N)	
	30-Day Average (lb/day)	Daily Maximum (lb/day)
January 1 – January 31		
James River flow < 100 cfs	477	1,041
James River flow 100 cfs – 1000 cfs	917	2,091
James River flow >1000 cfs	1,849	3,239
February 1 – February 29		
James River flow < 100 cfs	477	1,041
James River flow 100 cfs – 1000 cfs	917	2,091
James River flow >1000 cfs	1,849	3,239
March 1 – March 30		
James River flow < 100 cfs	143	468
James River flow 100 cfs – 1000 cfs	309	1,015
James River flow >1000 cfs	604	2,523
April 1 – April 30		
James River flow < 100 cfs	143	468
James River flow 100 cfs – 1000 cfs	309	655
James River flow >1000 cfs	594	1,068
May 1 – May 31		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572
June 1 – June 30		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572
July 1 – July 31		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572
August 1 – August 31		
James River flow < 100 cfs	80	141
James River flow 100 cfs – 1000 cfs	192	354
James River flow >1000 cfs	306	572
September 1 – September 30		
James River flow < 100 cfs	107	201
James River flow 100 cfs – 1000 cfs	205	522
James River flow >1000 cfs	323	849
October 1 – October 31		
James River flow < 100 cfs	107	201
James River flow 100 cfs – 1000 cfs	205	522
James River flow >1000 cfs	323	849

Season	Ammonia Limit (as N)	
	30-Day Average (lb/day)	Daily Maximum (lb/day)
November 1 – November 30		
James River flow < 100 cfs	115	201
James River flow 100 cfs – 1000 cfs	289	522
James River flow >1000 cfs	466	849
December 1 – December 31		
James River flow < 100 cfs	477	1,041
James River flow 100 cfs – 1000 cfs	917	2,091
James River flow >1000 cfs	1,849	3,239

The applicable 30-day average ammonia limit for each month shall be based on the 30-day average flow rate of the James River during that month. The applicable daily maximum limit shall be based on the flow rate of the James River on the day the sample was collected.

$$Ammonia\ \left(\frac{lb}{day}\right) = Ammonia\left(\frac{mg}{L}\right) \times Effluent\ Flow\ (MGD) \times 8.34$$

6. There shall be no Acute Toxicity, as measured by the Whole Effluent Toxicity test. This limit is based on the SDSWQS (ARSD Section 74:51:01:12), BPJ, and the current permit.

7. The Oil and Grease concentration shall not exceed 10 mg/L (in any grab sample) or impart a visible film or sheen to the surface of the water or the adjoining shorelines. This limit is based on the SDSWQS (ARSD 14:51:01:10) and current permit limits.

8. No chemicals, such as chlorine, shall be used without prior written permission. This limit is based on BPJ.

Effluent water temperature (°C), flow rate (MGD), total flow (million gallons), duration of discharge (days), instream flow of the James River (cfs), Molybdenum (mg/L), and the parameters listed in ARSD Sections 74:52:02:41 (µg/L), 74:52:02:42 (mg/L), and 74:52:02:44 (µg/L) shall be monitored, but will not have a limit.

Outfall 002

The permittee shall comply with the effluent limits specified below. These limits are based on the *South Dakota recommend Design Criteria Manual for Wastewater Collection and Treatment Facilities (Chapter 12 Disposal of Effluent by Irrigation*), BPJ, and current permit limits.

Outfall 002N - Any discharge to waters of the state from the land application pump system or land application sites (Latitude 43.670453º, Longitude -97.966147º - Navigational Quality GPS).

Effective immediately and lasting throughout the life of this permit, the permittee shall have **no discharge** of land applied waters to waters of the state, except in accordance with the bypass or emergency release provisions of the permit. If a discharge occurs or is expected to occur, the permittee shall report the occurrence in accordance with **Section 4.16 – Emergency Release Reporting Requirements** of the proposed permit and take the appropriate measures to minimize the discharge of pollutants. Such measures shall include the closing of facilities that contribute water to the wastewater treatment facility or the land application system until the discharge is terminated. **The act of land applying treated wastewater is not considered a discharge.**

Outfall 002R - Land application of wastewater to the land application sites (Latitude 43.670453º, Longitude -97.966147º- Navigational Quality GPS).

1. The application rate at the land application site shall be controlled so as to prevent any surface runoff of the effluent. This limit is based on BPJ and the *South Dakota Recommended Design Criteria Manual for Wastewater Collection and Treatment Facilities.*

2. To prevent ground saturation and runoff, no application is permitted during periods of heavy or prolonged rainfall, snow cover or when the ground is frozen. This limit is based on the *South Dakota Recommended Design Criteria Manual for Wastewater Collection and Treatment Facilities.*

3. The land application equipment shall, to the extent feasible, be installed in such a manner as to minimize wind drift of the effluent and formation of aerosols. This limit is based on the *South Dakota Recommended Design Criteria Manual for Wastewater Collection and Treatment Facilities.*

4. Appropriate warning signs shall be posted on the land application site to inform the public of the nature of the water. This limit is based on BPJ.

5. By **April 1, 2013,** the city will update and submit a land application best management plan for approval by SDDENR. The land application best management plan shall be based on *South Dakota Recommended Design Criteria Manual for Wastewater Collection and Treatment Facilities.* Once approved, the land application best management plan becomes an enforceable part of the permit. This limit is based on BPJ and the current permit.

Outfalls 003N and 004N

Outfall 003N - Any discharge from the manual bypass gate in the flow equalization basin to Dry Run Creek (Latitude 43.697661º, Longitude -97.992414º- Navigational Quality GPS).

Outfall 004N - Any discharge from the stabilization pond located adjacent to the Mitchell wastewater treatment plant office site and raw wastewater pumping station to Dry Run Creek (Latitude 43.697778º, Longitude -97.992500º- Navigational Quality GPS).

The city of Mitchell shall have **no discharge** from Outfalls 003N and 004N except in accordance with the bypass or emergency release provisions of the permit. If a discharge occurs or is expected to occur, the permittee shall report the occurrence in accordance with the emergency release provisions of the proposed permit and take the appropriate measures to minimize the discharge of pollutants. Such measures shall include the closing of facilities that contribute water to the wastewater treatment facility until the discharge is terminated. The no discharge requirement is based on past facility performance, BPJ, and current permit limits.

SELF MONITORING REQUIREMENTS

Reasonable Potential Analysis

The city of Mitchell was required to monitor metals under its current permit. SDDENR conducted an analysis of the metals data collected by the city of Mitchell to determine if there is a reasonable potential the surface water quality standards could be violated based on the city's discharge (See Attachment 8). The analysis indicated potential for chronic water quality standard violations for the following metals: cadmium, chromium, copper, selenium, and zinc. The analysis also indicated the potential for acute water quality standard violations for the following metals: cadmium, chromium, copper, and zinc.

The city of Mitchell has an authorized pretreatment program that allows for the city to set limits for industrial users. DENR will require the city to continue monitoring metals at the current frequency. During the proposed permit cycle, the city shall evaluate its pretreatment program and specifically re-evaluate its local limits for cadmium, chromium, copper, selenium, and zinc. The proposed permit will require the city monitor these metal levels quarterly. If there still is a reasonable potential for water quality violations following the changes to the pretreatment local limits, DENR will consider imposing effluent metal limits when the proposed permit is up for renewal.

Outfall 001A – Interim Self-Monitoring Requirements

Effective immediately and lasting through **April 30, 2014**, all authorized discharges, shall be monitored for the following parameters at the frequency and with the type of measurement indicated. The permittee shall report the monitoring results in accordance with reporting requirements found in the proposed permit.

Effluent Characteristic	Frequency	Reporting Values [1]	Sample Type [1]
Flow Rate, MGD	At least three per discharge[2, 3]	Daily Maximum; 30-Day Average	Instantaneous
James River instream flow rate, cfs	At least three per discharge[2, 3]	Daily Maximum; 30-Day Average	Instantaneous
pH, standard units	At least three per discharge[2]	Daily Minimum; Daily Maximum	Instantaneous[4, 5]
Water Temperature, °C	At least three per discharge[2]	Daily Maximum; 30-Day Average	Instantaneous[5, 6]

Effluent Characteristic	Frequency	Reporting Values [1]	Sample Type [1]
Five Day Biochemical Oxygen Demand (BOD_5), mg/L	At least three per discharge[2]	Max. 7-Day Average; 30-Day Average	Grab
Total Suspended Solids (TSS), mg/L	At least three per discharge[2]	Max. 7-Day Average; 30-Day Average	Grab
Fecal Coliform, no./100 mL	At least three per discharge[2, 7]	Daily Maximum; 30-Day Geometric Mean	Grab
Escherichia coli (E. coli), no./100mL	At least three per discharge[2, 7]	Daily Maximum; 30-Day Geometric Mean	Grab
Ammonia-Nitrogen (as N), mg/L	At least three per discharge[2]	Daily Maximum; 30-Day Average	Grab[3, 5]
Ammonia-Nitrogen (as N), lb/day	At least three per discharge[2]	Daily Maximum; 30-Day Average	Calculate[8]
Oil and Grease, visual [9]	At least three per discharge[2]	Presence or absence of sheen	Visual
Oil and Grease (hexane ext), mg/L	Contingent[9]	Daily Maximum	Grab
Total Flow, million gallons	Monthly	Monthly Total[10]	Calculate
Duration of Discharge, days	Monthly	Monthly Total	Calculate
Acute Whole Effluent Toxicity, TUa	Quarterly [11]	Pass/Fail; Actual Value	Grab

[1] See Definitions in the proposed permit.

[2] A minimum of three samples shall be taken during any discharge. A sample shall be taken at the beginning, middle, and end of the discharge if the discharge is less than one week in duration. If a single, continuous discharge is greater than one week in duration, three samples shall be taken the first week and one each following week. All of the samples collected during the 7-day or 30-day period are to be used in determining the averages. The permittee always has the option of collecting additional samples if appropriate.

[3] James River flow must be recorded when ammonia samples are collected. The flow rate shall be calculated using the flow from USGS 06478000 and subtracting the permittee's discharge flow rate (in cfs).

[4] pH shall be taken within 15 minutes of sample collection with a pH meter. The pH meter must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

[5] The pH and temperature of the effluent shall be determined when ammonia samples are collected.

[6] The water temperature of the effluent shall be taken as a field measurement at the time of sampling. Measurement shall be made with a mercury-filled, or dial type thermometer, or a thermistor. Readings shall be reported to the nearest whole degree Celsius.

[7] For fecal coliform and *E. coli*, if a minimum of five samples are collected in a calendar month, all of the samples collected are to be used in determining the geometric mean. Samples are to be collected at the same time as BOD_5, TSS, etc. Additional samples are to be collected during any other separate 24-hour periods. If less than five samples are taken during any calendar month, the maximum limit still applies. ***This sampling protocol only applies if the discharge occurs between May 1 and September 30.***

[8] Daily ammonia-nitrogen loadings (lb/day) shall be calculated by the following equation:

$$Ammonia\ \left(\frac{lb}{day}\right) = Ammonia\left(\frac{mg}{L}\right) \times Effluent\ Flow\ (MGD) \times 8.34$$

The 30-Day average ammonia loading (lb/day) shall be calculated by averaging the computed daily ammonia loadings (lb/day).

[9] A grab sample shall be taken if a visual sheen is observed and a concentration shall be determined using EPA method 1664A oil and grease hexane extraction.

[10] The date and time of the start and termination of each discharge shall also be reported in the comment section of the DMR.

[11] Acute WET testing shall be conducted during each calendar quarter in which a discharge is occurring. If a single, continuous discharge occurs in two calendar quarters and has a duration less than or equal to 90 days, only one WET test is required for that discharge. Refer to the acute WET testing section of the proposed permit.

Outfall 001A – Final Self-Monitoring Requirements

Effective **May 1, 2014,** and lasting through the life of the permit, all authorized discharges shall be monitored for the following parameters at the frequency and with the type of measurement indicated. The permittee shall report the monitoring results in accordance with reporting requirements of the proposed permit.

Effluent Characteristic	**Frequency**	**Reporting Values [1]**	**Sample Type [1]**
Flow Rate, MGD	At least three per discharge[2, 3]	Daily Maximum; 30-Day Average	Instantaneous
James River instream flow rate, cfs	At least three per discharge[2, 3]	Daily Maximum; 30-Day Average	Instantaneous
pH, standard units	At least three per discharge[2]	Daily Minimum; Daily Maximum	Instantaneous[4, 5]
Water Temperature, ºC	At least three per discharge[2]	Daily Maximum; 30-Day Average	Instantaneous[5, 6]
Five Day Biochemical Oxygen Demand (BOD_5), mg/L	At least three per discharge[2]	Max. 7-Day Average; 30-Day Average	Grab
Total Suspended Solids (TSS), mg/L	At least three per discharge[2]	Max. 7-Day Average; 30-Day Average	Grab
Escherichia coli (E. coli), no./100mL	At least three per discharge[2, 7]	Daily Maximum; 30-Day Geometric Mean	Grab
Ammonia-Nitrogen (as N), mg/L	At least three per discharge[2]	Daily Maximum; 30-Day Average	Grab[3, 5]
Ammonia-Nitrogen (as N), lb/day	At least three per discharge[2]	Daily Maximum; 30-Day Average	Calculate[8]
Oil and Grease, visual [9]	At least three per discharge[2]	Presence or absence of sheen	Visual
Oil and Grease (hexane ext), mg/L	Contingent[9]	Daily Maximum	Grab
Total Flow, million gallons	Monthly	Monthly Total[10]	Calculate
Duration of Discharge, days	Monthly	Monthly Total	Calculate
Acute Whole Effluent Toxicity, TUa	Quarterly [11]	Pass/Fail; Actual Value	Grab

[1] See Definitions in the proposed permit.

[2] A minimum of three samples shall be taken during any discharge. A sample shall be taken at the beginning, middle, and end of the discharge if the discharge is less than one week in duration. If a single, continuous discharge is greater than one week in duration, three samples

shall be taken the first week and one each following week. All of the samples collected during the 7-day or 30-day period are to be used in determining the averages. The permittee always has the option of collecting additional samples if appropriate.

[3] James River flow must be recorded when ammonia samples are collected. The flow rate shall be calculated using the flow from USGS 06478000 and subtracting the permittee's discharge flow rate (in cfs).

[4] pH shall be taken within 15 minutes of sample collection with a pH meter. The pH meter must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

[5] The pH and temperature of the effluent shall be determined when ammonia samples are collected.

[6] The water temperature of the effluent shall be taken as a field measurement at the time of sampling. Measurement shall be made with a mercury-filled, or dial type thermometer, or a thermistor. Readings shall be reported to the nearest whole degree Celsius.

[7] For *E. coli*, if a minimum of five samples are collected in a calendar month, all of the samples collected are to be used in determining the geometric mean. Samples are to be collected at the same time as BOD_5, TSS, etc. Additional samples are to be collected during any other separate 24-hour periods. If less than five samples are taken during any calendar month, the maximum limit still applies. ***This sampling protocol only applies if the discharge occurs between May 1 and September 30.***

[8] Daily ammonia-nitrogen loadings (lb/day) shall be calculated by the following equation:

$$Ammonia\left(\frac{lb}{day}\right) = Ammonia\left(\frac{mg}{L}\right) \times Effluent\ Flow\ (MGD) \times 8.34$$

The 30-Day average ammonia loading (lb/day) shall be calculated by averaging the computed daily ammonia loadings (lb/day).

[9] A grab sample shall be taken if a visual sheen is observed and a concentration shall be determined using EPA method 1664A oil and grease hexane extraction.

[10] The date and time of the start and termination of each discharge shall also be reported in the comment section of the DMR.

[11] Acute WET testing shall be conducted during each calendar quarter in which a discharge is occurring. If a single, continuous discharge occurs in two calendar quarters and has a duration less than or equal to 90 days, only one WET test is required for that discharge. Refer to the acute WET testing section of the proposed permit.

Outfall 001A – Metals Monitoring (ARSD Section74:52:02:42)

The permittee shall analyze the treatment facility influent and effluent for the presence of the toxic pollutants listed below at least as often as required below. The permittee shall report the monitoring results in accordance with reporting requirements of the proposed permit.

Effluent Characteristic	Frequency	Sample Type[1, 2]
Antimony, total, mg/L	Semiannually	3 Grabs
Arsenic, total, mg/L	Semiannually	3 Grabs
Beryllium, total, mg/L	Semiannually	3 Grabs
Cadmium, total, mg/L	Semiannually	3 Grabs
Chromium, total, mg/L	Semiannually	3 Grabs
Copper, total, mg/L	Semiannually	3 Grabs
Cyanide, weak acid dissociable, mg/L	Semiannually	3 Grabs
Lead, total, mg/L	Semiannually	3 Grabs
Mercury, total, mg/L	Semiannually	3 Grabs
Molybdenum, total, mg/L	Semiannually	3 Grabs
Nickel, total, mg/L	Semiannually	3 Grabs
Selenium, total, mg/L	Semiannually	3 Grabs
Silver, total, mg/L	Semiannually	3 Grabs
Thallium, total, mg/L	Semiannually	3 Grabs
Zinc, total, mg/L	Semiannually	3 Grabs
Cyanide, total, mg/L	Semiannually	3 Grabs
Phenols, total, mg/L	Semiannually	3 Grabs

[1] See Definitions.

[2] At least three grab samples, taken at equal intervals over a representative 24-hour period, shall be taken.

Outfall 001A – Toxics Monitoring

Priority Pollutants (ARSD Section 74:52:02:41)

The permittee shall analyze the treatment facility influent and effluent for the presence of the toxic pollutants listed below at least as often as required below. The permittee shall report the monitoring results in accordance with reporting requirements of the proposed permit.

Effluent Characteristic	Frequency	Sample Type[1, 2]
acrolein, µg/L	Annual	3 Grabs
acrylonitrile, µg/L	Annual	3 Grabs
benzene, µg/L	Annual	3 Grabs

Effluent Characteristic	Frequency	Sample Type[1, 2]
bis (chloromethyl) ether, µg/L	Annual	3 Grabs
bromoform, µg/L	Annual	3 Grabs
carbon tetrachloride, µg/L	Annual	3 Grabs
chlorobenzene, µg/L	Annual	3 Grabs
chlorodibromomethane, µg/L	Annual	3 Grabs
chlorethane, µg/L	Annual	3 Grabs
2-chloroethylvinyl ether, µg/L	Annual	3 Grabs
chloroform, µg/L	Annual	3 Grabs
dichlorobromomethane, µg/L	Annual	3 Grabs
dichlorodifluoromethane, µg/L	Annual	3 Grabs
1,1-dichloroethane, µg/L	Annual	3 Grabs
1,2-dichloroethane, µg/L	Annual	3 Grabs
1,1-dichloroethylene, µg/L	Annual	3 Grabs
1,2-dichloropropane, µg/L	Annual	3 Grabs
1,3-dichloropropylene, µg/L	Annual	3 Grabs
ethylbenzene, µg/L	Annual	3 Grabs
methyl bromide, µg/L	Annual	3 Grabs
methyl chloride, µg/L	Annual	3 Grabs
methylene chloride, µg/L	Annual	3 Grabs
1,1,2,2-tetrachloroethane, µg/L	Annual	3 Grabs
tetrachloroethylene, µg/L	Annual	3 Grabs
toluene, µg/L	Annual	3 Grabs
1,2-trans-dichloroethylene, µg/L	Annual	3 Grabs
1,1,1-trichloroethane, µg/L	Annual	3 Grabs
1,1,2-trichloroethane, µg/L	Annual	3 Grabs
trichloroethylene, µg/L	Annual	3 Grabs
trichlorofluoromethane, µg/L	Annual	3 Grabs
vinyl chloride, µg/L	Annual	3 Grabs
2-chlorophenol, µg/L	Annual	3 Grabs
2,4-dichlorophenol, µg/L	Annual	3 Grabs
2,4-dimethylphenol, µg/L	Annual	3 Grabs

Effluent Characteristic	Frequency	Sample Type[1, 2]
4,6-dinitro-o-cresol, µg/L	Annual	3 Grabs
2,4-dinitrophenol, µg/L	Annual	3 Grabs
2-nitrophenol, µg/L	Annual	3 Grabs
4-nitrophenol, µg/L	Annual	3 Grabs
p-chloro-m-cresol, µg/L	Annual	3 Grabs
pentachlorophenol, µg/L	Annual	3 Grabs
phenol, µg/L	Annual	3 Grabs
2,4,6-trichlorophenol, µg/L	Annual	3 Grabs
acenaphthene, µg/L	Annual	3 Grabs
acenaphthylene, µg/L	Annual	3 Grabs
anthracene, µg/L	Annual	3 Grabs
benzidine, µg/L	Annual	3 Grabs
benzo(a)anthracene, µg/L	Annual	3 Grabs
benzo(a)pyrene, µg/L	Annual	3 Grabs
3,4-benzofluoranthene, µg/L	Annual	3 Grabs
benzo(ghi)perylene, µg/L	Annual	3 Grabs
benzo(k)fluoranthene, µg/L	Annual	3 Grabs
bis(2-chloroethyoxy)methane, µg/L	Annual	3 Grabs
bis(2-chloroethyl)ether, µg/L	Annual	3 Grabs
bis(2-chloroisopropyl)ether, µg/L	Annual	3 Grabs
bis(2-ethylhexyl)phthalate, µg/L	Annual	3 Grabs
4-bromophenyl phenyl ether, µg/L	Annual	3 Grabs
butylbenzyl phthalate, µg/L	Annual	3 Grabs
2-chloronapthalene, µg/L	Annual	3 Grabs
4-chlorophenyl phenyl ether, µg/L	Annual	3 Grabs
chrysene, µg/L	Annual	3 Grabs
dibenzo(a,h)anthracene, µg/L	Annual	3 Grabs
1,2-dichlorobenzene, µg/L	Annual	3 Grabs
1,3-dichlorobenzene, µg/L	Annual	3 Grabs
1,4-dichlorobenzene, µg/L	Annual	3 Grabs
3,3'-dichlorobenzidine, µg/L	Annual	3 Grabs

Effluent Characteristic	Frequency	Sample Type[1, 2]
diethyl phthalate, µg/L	Annual	3 Grabs
dimethyl phthalate, µg/L	Annual	3 Grabs
di-n-butyl phthalate, µg/L	Annual	3 Grabs
2,4-dinitrotoluene, µg/L	Annual	3 Grabs
2,6-dinitrotoluene, µg/L	Annual	3 Grabs
di-n-octyl phthalate, µg/L	Annual	3 Grabs
1,2-diphenylhydrazine (as azobenzene), µg/L	Annual	3 Grabs
fluoranthene, µg/L	Annual	3 Grabs
fluorene, µg/L	Annual	3 Grabs
hexachlorobenzene, µg/L	Annual	3 Grabs
hexachlorobutadiene, µg/L	Annual	3 Grabs
hexachlorocyclopentadiene, µg/L	Annual	3 Grabs
hexachloroethane, µg/L	Annual	3 Grabs
indeno(1,2,3-cd)pyrene, µg/L	Annual	3 Grabs
isophorone, µg/L	Annual	3 Grabs
naphthalene, µg/L	Annual	3 Grabs
nitrobenzene, µg/L	Annual	3 Grabs
N-nitrosodimethylamine, µg/L	Annual	3 Grabs
N-nitrosodi-n-propylamine, µg/L	Annual	3 Grabs
N-nitrosodiphenylamine, µg/L	Annual	3 Grabs
phenanthrene, µg/L	Annual	3 Grabs
pyrene, µg/L	Annual	3 Grabs
1,2,4-trichlorobenzene, µg/L	Annual	3 Grabs
aldrin, µg/L	Annual	3 Grabs
alpha-BHC, µg/L	Annual	3 Grabs
beta-BHC, µg/L	Annual	3 Grabs
gamma-BHC, µg/L	Annual	3 Grabs
delta-BHC, µg/L	Annual	3 Grabs
chlordane, µg/L	Annual	3 Grabs
4,4'-DDT, µg/L	Annual	3 Grabs

Effluent Characteristic	Frequency	Sample Type[1, 2]
4,4'-DDE, µg/L	Annual	3 Grabs
4,4'-DDD, µg/L	Annual	3 Grabs
dieldrin, µg/L	Annual	3 Grabs
alpha-endosulfan, µg/L	Annual	3 Grabs
beta-endosulfan, µg/L	Annual	3 Grabs
endosulfan sulfate, µg/L	Annual	3 Grabs
endrin, µg/L	Annual	3 Grabs
endrin aldehyde, µg/L	Annual	3 Grabs
heptachlor, µg/L	Annual	3 Grabs
heptachlor epoxide, µg/L	Annual	3 Grabs
PCB-1242, µg/L	Annual	3 Grabs
PCB-1254, µg/L	Annual	3 Grabs
PCB-1221, µg/L	Annual	3 Grabs
PCB-1232, µg/L	Annual	3 Grabs
PCB-1248, µg/L	Annual	3 Grabs
PCB-1260, µg/L	Annual	3 Grabs
PCB-1016, µg/L	Annual	3 Grabs
toxaphene, µg/L	Annual	3 Grabs

[1] See Definitions.

[2] At least three grab samples, taken at equal intervals over a representative 24-hour period, shall be taken.

Other Toxic Pollutants (ARSD 74:52:02:44)

If, based upon information available to the permittee, there is reason to suspect the presence of any toxic or hazardous pollutant below, or any other pollutant, known or suspected adversely affect treatment plant operation, receiving water quality, or solids disposal procedures, analysis for those pollutants shall be performed at least semiannually on both the influent and the effluent. The permittee shall report the monitoring results in accordance with reporting requirements of the proposed permit.

Effluent Characteristic	Frequency	Sample Type[1, 2]
Asbestos, µg/L	Semiannually, if suspected	3 Grabs
Acetaldhyde, µg/L	Semiannually, if suspected	3 Grabs

Effluent Characteristic	Frequency	Sample Type[1, 2]
Allyl alcohol, µg/L	Semiannually, if suspected	3 Grabs
Allyl chloride, µg/L	Semiannually, if suspected	3 Grabs
Amyl acetate, µg/L	Semiannually, if suspected	3 Grabs
Aniline, µg/L	Semiannually, if suspected	3 Grabs
Benzonitrile, µg/L	Semiannually, if suspected	3 Grabs
Benzyl chloride, µg/L	Semiannually, if suspected	3 Grabs
Butyl acetate, µg/L	Semiannually, if suspected	3 Grabs
Butylamine, µg/L	Semiannually, if suspected	3 Grabs
Captan, µg/L	Semiannually, if suspected	3 Grabs
Carbaryl, µg/L	Semiannually, if suspected	3 Grabs
Carbofuran, µg/L	Semiannually, if suspected	3 Grabs
Carbon disulfide, µg/L	Semiannually, if suspected	3 Grabs
Chlorpyrifos, µg/L	Semiannually, if suspected	3 Grabs
Coumaphos, µg/L	Semiannually, if suspected	3 Grabs
Cresol, µg/L	Semiannually, if suspected	3 Grabs
Crotonaldehyde, µg/L	Semiannually, if suspected	3 Grabs
Cyclohexane, µg/L	Semiannually, if suspected	3 Grabs
2,4-D(2,4-Dichlorophenoxy acetic acid), µg/L	Semiannually, if suspected	3 Grabs
Diazinon, µg/L	Semiannually, if suspected	3 Grabs
Dicamba, µg/L	Semiannually, if suspected	3 Grabs
Dichlobenil, µg/L	Semiannually, if suspected	3 Grabs
Dichlone, µg/L	Semiannually, if suspected	3 Grabs
2,2-Dichloropropionic acid, µg/L	Semiannually, if suspected	3 Grabs
Dichlorvos, µg/L	Semiannually, if suspected	3 Grabs
Diethyl amine, µg/L	Semiannually, if suspected	3 Grabs
Dimethyl amine, µg/L	Semiannually, if suspected	3 Grabs
Dintrobenzene, µg/L	Semiannually, if suspected	3 Grabs
Diquat, µg/L	Semiannually, if suspected	3 Grabs
Disulfoton, µg/L	Semiannually, if suspected	3 Grabs
Diuron, µg/L	Semiannually, if suspected	3 Grabs

Effluent Characteristic	Frequency	Sample Type[1, 2]
Epichlorohydrin, µg/L	Semiannually, if suspected	3 Grabs
Ethanolamine, µg/L	Semiannually, if suspected	3 Grabs
Ethion, µg/L	Semiannually, if suspected	3 Grabs
Ethylene diamine, µg/L	Semiannually, if suspected	3 Grabs
Ethylene dibromide, µg/L	Semiannually, if suspected	3 Grabs
Formaldehyde, µg/L	Semiannually, if suspected	3 Grabs
Furfural, µg/L	Semiannually, if suspected	3 Grabs
Guthion, µg/L	Semiannually, if suspected	3 Grabs
Isoprene, µg/L	Semiannually, if suspected	3 Grabs
Isopropanolamine dodecylbenzenesulfonate, µg/L	Semiannually, if suspected	3 Grabs
Kelthane, µg/L	Semiannually, if suspected	3 Grabs
Kepone, µg/L	Semiannually, if suspected	3 Grabs
Malathion, µg/L	Semiannually, if suspected	3 Grabs
Mercaptodimethur, µg/L	Semiannually, if suspected	3 Grabs
Methoxychlor, µg/L	Semiannually, if suspected	3 Grabs
Methyl mercaptan, µg/L	Semiannually, if suspected	3 Grabs
Methyl methacrylate, µg/L	Semiannually, if suspected	3 Grabs
Methyl parathion, µg/L	Semiannually, if suspected	3 Grabs
Mevinphos, µg/L	Semiannually, if suspected	3 Grabs
Mexacarbate, µg/L	Semiannually, if suspected	3 Grabs
Monoethyl amine, µg/L	Semiannually, if suspected	3 Grabs
Monomethyl amine, µg/L	Semiannually, if suspected	3 Grabs
Naled, µg/L	Semiannually, if suspected	3 Grabs
Napthenic acid, µg/L	Semiannually, if suspected	3 Grabs
Nitrotoluene, µg/L	Semiannually, if suspected	3 Grabs
Parathion, µg/L	Semiannually, if suspected	3 Grabs
Phenolsulfanate, µg/L	Semiannually, if suspected	3 Grabs
Phosgene, µg/L	Semiannually, if suspected	3 Grabs
Propargite, µg/L	Semiannually, if suspected	3 Grabs
Propylene oxide, µg/L	Semiannually, if suspected	3 Grabs

Effluent Characteristic	Frequency	Sample Type[1, 2]
Pyrethrins, µg/L	Semiannually, if suspected	3 Grabs
Quinoline, µg/L	Semiannually, if suspected	3 Grabs
Resorcinol, µg/L	Semiannually, if suspected	3 Grabs
Strontium, µg/L	Semiannually, if suspected	3 Grabs
Strychnine, µg/L	Semiannually, if suspected	3 Grabs
Styrene, µg/L	Semiannually, if suspected	3 Grabs
2,4,5-T(2,4,5-Trichlorophenoxy acetic acid), µg/L	Semiannually, if suspected	3 Grabs
TDE(Tetrachlorodiphenylethane), µg/L	Semiannually, if suspected	3 Grabs
2,4,5-TP {2-(2,4,5-trichlorophenoxy)propanoic acid}	Semiannually, if suspected	3 Grabs
Trichlorofan, µg/L	Semiannually, if suspected	3 Grabs
Triethanolamine, µg/L dodecylbenzenesulfonate, µg/L	Semiannually, if suspected	3 Grabs
Triethylamine, µg/L	Semiannually, if suspected	3 Grabs
Trimethylamine, µg/L	Semiannually, if suspected	3 Grabs
Uranium, µg/L	Semiannually, if suspected	3 Grabs
Vanadium, µg/L	Semiannually, if suspected	3 Grabs
Vinyl acetate, µg/L	Semiannually, if suspected	3 Grabs
Xylene, µg/L	Semiannually, if suspected	3 Grabs
Xylenol, µg/L	Semiannually, if suspected	3 Grabs
Zirconium, µg/L	Semiannually, if suspected	3 Grabs

[1] See Definitions.

[2] At least three grab samples, taken at equal intervals over a representative 24-hour period, shall be taken.

Outfall 002R – Land-Application Monitoring Requirements

All land application of wastewater shall be monitored for the following parameters at the frequency and with the type of measurement indicated. The permittee shall report the monitoring results in accordance with reporting requirements found in the proposed permit**.**

Effluent Characteristic	Frequency	Reporting Values[1]	Sample Type[1]
Rate of Land Application, MGD	Weekly	Daily Maximum; 30-Day Average	Instantaneous
Days Land Applied, days	Monthly	Monthly Total	Calculate
Total Amount Land Applied, million gallons	Monthly	Monthly Total[2]	Calculate
pH, standard units	Monthly[3]	Daily Minimum; Daily Maximum	Instantaneous[4,5]
Water Temperature, °C	Monthly[3]	Daily Maximum; 30-Day Average	Instantaneous[4,6]
Fecal Coliform, no./l00 mL[7]	Monthly[3]	Daily Maximum; 30-Day Geometric Mean	Grab
Sodium Absorption Ratio (SAR)[8]	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Conductivity, µmhos/cm	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Total Kjeldahl Nitrogen, mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Ammonia-Nitrogen (as N), mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Total Nitrates (as N), mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Total Nitrites (as N), mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Total Sulfates, mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Total Chlorides, mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Total Phosphorous (as P), mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab
Total Dissolved Solids (TDS), mg/L	Monthly[3]	Daily Maximum; 30-Day Average	Grab

[1] See Definitions in the proposed permit.

[2] The date and time of the start and termination of each land application event shall also be reported in the comments section of the DMR.

[3] A minimum of one sample per month shall be taken for the duration of land application activities. Samples shall be taken from the land application wetwell and shall be representative of the land applied water. The permittee always has the option of collecting additional samples if appropriate.

[4] The pH and temperature of the effluent shall be determined when ammonia samples are collected.

[5] The pH shall be taken within 15 minutes of sample collection with a pH meter. The pH meter must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

[6] The water temperature of the effluent shall be taken as a field measurement. Measurement shall be made with a mercury-filled, or dial type thermometer, or a thermistor. Readings shall be reported to the nearest whole degree Celsius.

[7] For fecal coliform, if a minimum of five samples are collected in a calendar month, all of the samples collected are to be used in determining the geometric mean. Samples are to be collected at the same time as BOD_5, TSS, etc. Additional samples are to be collected during any other separate 24-hour periods. If less than five samples are taken during any calendar month, the maximum limit still applies.

[8] The sodium absorption ratio is calculated using the Gapon equation: $SAR = \frac{Na}{\sqrt{\frac{(Ca + Mg)}{2}}}$

Unauthorized Discharge Monitoring Requirements

Promptly upon discovery of a discharge from Outfall 002N, Outfall 003N, Outfall 004N, an emergency discharge, or sanitary sewer overflow, the discharge shall be monitored for the following parameters at the frequency and with the type of measurement indicated. Knowingly discharging or failing to report a discharge within a reasonable time from the permittee first learning of a discharge could subject the permittee to penalties as provided under the South Dakota Water Pollution Control Act. The permittee shall report the monitoring results in accordance with emergency release reporting requirements found in the proposed permit**.**

Effluent Characteristic	**Frequency**	**Reporting Value**	**Sample Type** [1]
Total Flow, million gallons	Each Discharge [2]	Event Total	Calculated
Duration of Discharge, days	Each Discharge [2]	Event Total	Calculated
Flow Rate, gallons per day	Daily [3]	Actual Value	Instantaneous
pH, standard units	Daily [3]	Actual Value	Instantaneous [4,5]
Water Temperature, °C	Daily [3]	Actual Value	Instantaneous [4,6]
Total Suspended Solids (TSS), mg/L	Daily [3]	Actual Value	Grab
Five-Day Biochemical Oxygen Demand (BOD_5), mg/L	Daily [3]	Actual Value	Grab
Ammonia as N, mg/L	Daily [3]	Actual Value	Grab [4]
Escherichia coli (*E. coli)*, no./l00 mL	Daily [3]	Actual Value	Grab
Oil and Grease, visual	Daily [3,7]	Presence or Absence of Sheen	Visual
Oil and Grease, mg/L	Contingent [7]	Actual Value	Grab

[1] See Definitions.

[2] The permittee shall report the date and time of the start and termination of each discharge, along with the total number of gallons discharged during the entire discharge event.

[3] The permittee shall take a minimum of one sample per day during any emergency release, bypass, sanitary sewer overflow, or other discharge unless SDDENR authorizes an alternative sampling schedule.

[4] The pH and temperature of the effluent shall be determined when ammonia samples are collected.

[5] pH shall be taken within 15 minutes of sample collection with a pH meter. The pH meter must be capable of simultaneous calibration to two points on the pH scale that bracket the expected

pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment. Readings shall be reported to the nearest 0.1 standard units.

[6] The water temperature of the effluent shall be taken as a field measurement. Measurement shall be made with a mercury-filled, or dial type thermometer, or a thermistor. Readings shall be reported to the nearest whole degree Fahrenheit.

[7] The presence or absence of an oil sheen shall be visually monitored. In the event that an oil sheen or floating oil is observed during discharge, grab samples shall be taken immediately and a concentration shall be determined using EPA method 1664A oil and grease hexane extraction.

Whole Effluent Toxicity (WET) Testing

The city of Mitchell shall test for acute toxicity according to the requirements of the proposed permit. Acute toxicity shall be tested on a quarterly basis using both *Ceriodaphnia dubia* (water flea) and *Pimephales promelas* (fathead minnow). If acute toxicity occurs, an additional test shall be conducted within 14 days of the date of the initial sample. The quarterly test results shall be reported along with the DMR submitted for the end of the reporting quarter.

SDDENR is moving towards switching from a WET limit of Pass/Fail to Toxic Units (TUa = Acute Toxic Units, TUc = Chronic Toxic Units). One of the advantages to switching to TU's is that it will allow labs, facilities, and SDDENR to use statistics to help eliminate false negatives and false positives, providing more accurate results. Therefore, in this permit cycle, the facility will be required to report in both Pass/Fail and TUa.

If the results for ten consecutive quarters of testing indicate no acute toxicity, the permittee may request the permit issuing authority to allow a reduction to quarterly acute toxicity testing on only one species on an alternating basis. The permit issuing authority may approve or deny the request based on the results and other available information without an additional public notice. If the request is approved, the test procedures are to be the same as stated within the proposed permit for the test species.

Inspection Requirements

The permittee shall inspect the mechanical processes of the wastewater treatment facility at least **five times per week.** Inspection of Outfall 001A shall be conducted on at least a **monthly** basis. **Daily** inspections are required during a discharge. Outfall 002R shall be inspected on at least a **monthly** basis. The intake of the land application system shall be inspected and meter readings taken on a **daily** basis while land application is occurring. The permittee shall also ensure that the land application system is operating correctly and that no runoff is occurring on a **daily** basis while land application is occurring. Outfalls 003N and 004N shall be inspected on a **weekly** basis to verify that proper operation and maintenance procedures are being practiced and whether or not there is a discharge occurring from these outfalls. Documentation of each of these visits shall be kept in a notebook to be reviewed by SDDENR or EPA personnel when an inspection occurs.

All lift stations shall be inspected at least **two times per week**. However, **daily** inspections of the lift stations are recommended. Documentation of each of these visits shall be kept in a notebook to be reviewed by SDDENR or EPA personnel when an inspection occurs.

Reporting Requirements
Effluent and land application monitoring results shall be summarized for each month and recorded on separate DMRs to be submitted to SDDENR on a **monthly** basis. If no discharge or land application (Outfall 002R) occurs during a month, it shall be stated as such on the DMR.

Actual metals and toxic pollutant monitoring results shall be submitted along with the corresponding DMR and submitted to SDDENR by the 28th day of the month following the end of the reporting period.

Effluent monitoring results obtained from Outfall 002 (release of land applied wastewater), Outfall 003, and Outfall 004 during the previous month shall be summarized, reported on a copy of the Emergency Release Reporting Form (found in Appendix A), and submitted to SDDENR on a **monthly** basis. These must be postmarked no later than the 28th day of the month following the completed reporting period.

LAND APPLICATION BEST MANAGEMENT PRACTICES PLAN

By **April 1, 2013**, the city shall submit to SDDENR for review and approval a Best Management Practices Plan for land application. The goal of the plan shall be to ensure protection of surface and ground water supplies and to protect human health. The plan shall be prepared in accordance with the *South Dakota Recommended Design Criteria manual for Wastewater Collection and Treatment Facilities.*

The department shall be kept informed of the land application sites and the proposed time frame of use, and shall be notified at least 30 days in advance of any changes. The plan must be updated to include all site changes and submitted to SDDENR for review and approval.

PRETREATMENT

The city of Mitchell operates an industrial pretreatment program in accordance with Part 6.0 of the proposed permit. The city of Mitchell has the responsibility for writing, implementing, and enforcing regulations on the industries which discharge wastewater to the city.

STORM WATER

The city of Mitchell has obtained a No Exposure Certification under the General Permit for Storm Water Discharges Associated with Industrial Activity, therefore they are exempt from storm water permitting.

SLUDGE

Based on the city of Mitchell's permit application, SDDENR does not anticipate sludge will be removed or disposed of during the life of the permit. Therefore, the proposed Surface Water

Discharge permit shall not contain sludge disposal requirements. However, if sludge disposal is necessary, the city of Mitchell is required to submit to SDDENR a sludge disposal plan for review and approval **prior** to the removal and disposal of sludge.

DRAINAGE ISSUES

Davison and Hanson Counties have the authority to regulate drainage where the wastewater treatment facility is located. The city of Mitchell is responsible for getting any necessary drainage permits from the counties **prior** to discharging.

ENDANGERED SPECIES

This is a renewal of an existing permit. No listed endangered species are expected to be impacted by activities related to this permit. However, the table below shows the species that may be present in the city of Mitchell's geographic area.

COUNTY	GROUP	SPECIES	CERTAINTY OF OCCURANCE
DAVISON AND HANSON	BIRD	CRANE, WHOOPING	POSSIBLE
	FISH	SHINER, TOPEKA	KNOWN

This information was accessible at the following US Fish and Wildlife Service website as of July 17, 2012: http://www.fws.gov/southdakotafieldoffice/SpeciesByCounty.pdf.

PERMIT EXPIRATION

A five-year permit is recommended.

PERMIT CONTACT

Any questions pertaining to this statement of basis can be directed to Tina Piroutek, Engineer II, for the Surface Water Quality Program, at (605) 773-3351.

July 17, 2012

ATTACHMENT 1

Antidegradation Review

Permit Type: **Major Municipal - Renewal** Applicant: **City of Mitchell**
Date Received: **5/21/2010** Permit #: **SD0023361**
County: **Davison & Hanson** Legal Description: **NE ¼ of Sec 26, T103N, R60W, NE ¼ Sec 1, T102N, R60W, and NW ¼ Sec 6, T102N, R59W.**
Receiving Stream: **James River** Classification: **5, 8, 9, 10**
If the discharge affects a downstream waterbody with a higher use classification, list its name and uses: **None**

APPLICABILITY

1. Is the permit or the stream segment exempt from the antidegradation review process under ARSD 74:51:01? Yes ☒ No ☐ If no, go to question #2. If yes, check those reasons why the review is not required:

☐ Existing facility covered under a surface water discharge permit is operating at or below design flows and pollutant loadings;
☐ *Existing effluent quality from a surface water discharge permitted facility is in compliance with all discharge permit limits;

☐ *Existing surface water discharge permittee was discharging to the current stream segment prior to March 27, 1973, and the quality and quantity of the discharge has not degraded the water quality of that segment as it existed on March 27, 1973;
☐ *The existing surface water discharge permittee, with DENR approval, has upgraded or built new wastewater treatment facilities between March 27, 1973, and July 1, 1988;
☐ The existing surface water discharge permittee discharges to a receiving water assigned only the beneficial uses of (9) and (10); the discharge is not expected to contain toxic pollutants in concentrations that may cause an impact to the receiving stream; and DENR has documented that the stream cannot attain a higher use classification. This exemption does not apply to discharges that may cause impacts to downstream segments that are of higher quality;
☐ Receiving water meets Tier 1 waters criteria. Any permitted discharge must meet water quality standards;
☐ The permitted discharge will be authorized by a Section 404 Corps of Engineers Permit, will undergo a similar review process in the issuance of that permit, and will be issued a 401 certification by the department, indicating compliance with the state's antidegradation provisions; or
☒ Other: This permit does not authorize an increase in effluent limits.

*An antidegradation review is not required where the proposal is to maintain or improve the existing effluent levels and conditions. Proposals for increased effluent levels, in these categories of activities are subject to review.

No further review required.

ANTIDEGRADATION REVIEW SUMMARY

2. The outcome of the review is:
   - ☒ A formal antidegradation review was not required for reasons stated in this worksheet. Any permitted discharge must ensure water quality standards will not be violated.
   - ☐ The review has determined that degradation of water quality should not be allowed. Any permitted discharge would have to meet effluent limits or conditions that would not result in any degradation estimated through appropriate modeling techniques based on ambient water quality in the receiving stream, or pursue an alternative to discharging to the waterbody.
   - ☐ The review has determined that the discharge will cause an insignificant change in water quality in the receiving stream. The appropriate agency may proceed with permit issuance with the appropriate conditions to ensure water quality standards are met.
   - ☐ The review has determined, with public input, that the permitted discharge is allowed to discharge effluent at concentrations determined through a total maximum daily load (TMDL). The TMDL will determine the appropriate effluent limits based on the upstream ambient water quality and the water quality standard(s) of the receiving stream.
   - ☐ The review has determined that the discharge is allowed. However, the full assimilative capacity of the receiving stream cannot be used in developing the permit effluent limits or conditions. In this case, a TMDL must be completed based on the upstream ambient water quality and the assimilative capacity allowed by the antidegradation review.
   - ☐ Other: _____

3. Describe any other requirements to implement antidegradation or any special conditions That are required as a result of this antidegradation review: _____

Tina Piroutek — Reviewer — July 17, 2012 — Date

Kelli D. Buscher, P.E. — Team Leader — July 17, 2012 — Date

ATTACHMENT 2

Monitoring Data

Outfall 001-Effluent Monitoring

	BOD_5		Total Residual Chlorine	Fecal Coliform		Flow rate	
	30 Day Avg.	Max 7 Day Avg.	Daily Max	30 Day Geo . Mean	Daily Max	30 Day Avg.	Daily Max
Limit	30 mg/L	45 mg/L	.019 mg/L	1000 #/100mL	2000 #/100mL	N/A MGD	N/A MGD
04/30/2006	20.7	28.4	NR	NR	NR	11.57	19.71
11/30/2006	8.19	9.55	NR	NR	NR	7.02	11.13
12/31/2006	8.64	13.5	NR	NR	NR	1.37	4.33
06/30/2007	5.11	9.14	NR	16.7	130	13.22	15.03
12/31/2007	6.02	7.49	NR	NR	NR	12.85	15.94
05/31/2008	8.34	8.34	NR	BD	BD	4.88	5
06/30/2008	9.28	14.6	NR	BD	BD	8.63	12.31
12/31/2008	6.03	7.56	NR	NR	NR	10.48	16
06/30/2009	8.74	11.5	NR	BD	BD	13.49	15.51
11/30/2009	5.38	6.59	NR	NR	NR	13.53	15.82
04/30/2010	13.43	15.4	NR	NR	NR	12.98	13.94
10/31/2010	11.9	19.2	NR	NR	NR	12.85	14.12
11/30/2010	9.21	10.2	NR	NR	NR	11.81	14.06
05/31/2011	6.23	9.71	NR	BD	BD	13.84	14.07
06/30/2011	11.4	11.4	NR	BD	BD	11.97	13.88
11/30/2011	5.1	6.35	NR	NR	NR	13.87	14.33
12/31/2011	5.97	7.28	NR	NR	NR	10.32	14.20

	Ammonia (as N)				Oil & Grease		pH	
	30 Day Avg	Daily Max	30 Day Avg	Daily Max	Visual	Daily Max	Daily Min	Daily Max
Limit	Varies lb/d	Varies lb/d	N/A mg/L	N/A mg/L	Y=1;N=0	10 mg/L	6.5 SU	9 SU
04/30/2006	18	36	0.32	0.84	0	NR	8.6	**9.4**
11/30/2006	92	114	1.88	2.62	0	NR	8.31	8.71
12/31/2006	52	112	2.64	3.11	0	NR	8.23	8.91
06/30/2007	13.22	22.2	0.12	0.18	0	NR	8.5	9
12/31/2007	18.9	35.7	0.18	0.28	0	NR	8.72	8.94
05/31/2008	171	180	4.33	4.58	0	NR	8.59	8.72
06/30/2008	248	421	3.88	4.43	0	NR	7.72	8.41
12/31/2008	58.9	78.1	0.56	0.6	0	NR	8.42	8.91
06/30/2009	40.9	49	0.34	0.4	0	NR	9.38	**9.58**
11/30/2009	85	162	0.817	1.3	0	NR	7.75	8.59
04/30/2010	48.8	85.5	0.437	0.762	0	NR	8.58	**9.38**
10/31/2010	105	129	0.97	1.27	0	NR	8.05	8.71
11/30/2010	226	237	1.94	2.04	0	NR	8.61	8.7
05/31/2011	104	157	0.91	1.37	0	NR	8.28	8.92
06/30/2011	5.9	5.9	0.051	0.051	0	NR	8.88	8.88
11/30/2011	129	139	1.16	1.17	0	NR	8.45	8.60
12/31/2011	182	295	2.87	5.00	0	NR	8.05	8.36

	TSS		Temperature	
	30 Day Avg.	Max 7 Day Avg.	30 Day Avg.	Daily Max
Limit	30 mg/L	45 mg/L	N/A ºC	N/A ºC
04/30/2006	33.33	43.3	11	15
11/30/2006	13.9	18.5	4.5	5.8
12/31/2006	10.1	16.5	3.2	5
06/30/2007	10.9	21.8	23.3	24.5
12/31/2007	15.9	18.5	2.2	2.6
05/31/2008	7.31	7.31	12.8	13.4
06/30/2008	10.4	20	21.8	23.8
12/31/2008	11.56	13.3	1.4	1.7
06/30/2009	19.8	22.5	19.2	24.3
11/30/2009	13.6	20.3	6.4	8.1
04/30/2010	28.4	39	10.1	15.3
10/31/2010	29.9	38	14	16.4
11/30/2010	26.3	29	8.25	9.3
05/31/2011	9.17	18.3	15.6	16.8
06/30/2011	29.3	29.3	18	18
11/30/2011	11.7	13.3	2.5	3.2
12/31/2011	7.69	11.0	2.0	3.7

Notes:

Highlighted Cells=Effluent Limit Violations

NR= "Not Required" Parameter was not required to be sampled during the reporting period

BD= "Below Detection Limit"

Outfall 001-Acute WET Testing

	Acute WET Testing: Ceriodaphnia	Acute WET Testing: Pimephales Promelas
	Daily Max	Daily Max
	Pass or Fail	Pass or Fail
06/30/2006	NR	Pass
12/31/2006	Pass	NR
06/30/2007	NR	Pass
12/31/2007	Pass	NR
06/30/2008	NR	Pass
12/31/2008	Pass	NR
06/30/2009	NR	Pass
12/31/2009	Pass	NR
06/30/2010	NR	Pass
12/31/2010	Pass	NR
06/30/2011	NR	Pass
12/31/2011	Pass	NR

Notes:

NR= "Not Required" Parameter was not required to be sampled during the reporting period.

Outfall 001- Effluent Metals Monitoring

	Antimony, total (as Sb)	Arsenic, total (as As)	Beryllium, total (as Be)	Cadmium, total (as Cd)	Chromium, total (as Cr)	Copper, total (as Cu)	Cyanide, total (as CN)	Cyanide, weak acid, dissociable
	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max
	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L
06/30/2006	BD	BD	BD	57.05	3.8	37.7	BD	BD
12/31/2006	BD	BD	BD	BD	BD	29.2	BD	BD
06/30/2007	BD	2.4	BD	BD	BD	3.6	BD	BD
12/31/2007	2	2	0.25	0.25	9.4	8	20	20
06/30/2008	2	2	1	1	2.3	23.5	20	20
12/31/2008	2	2.8	1	1	2.4	33.5	20	20
06/30/2009	BD	2.9	BD	BD	BD	35.7	BD	BD
12/31/2009	BD	BD	BD	BD	BD	6.8	BD	BD
06/30/2010	BD	BD	BD	BD	BD	41.3	BD	BD
12/31/2010	2	2	1	1	2	3	20	20
06/30/2011	BD	BD	BD	1.65	BD	11.3	BD	BD
12/31/2011	BD	BD	BD	BD	BD	2.3	BD	BD

	Lead, total (as Pb)	Mercury, total (as Hg)	Molybdenum, total (as Mo)	Nickel, total (as Ni)	Phenols	Selenium, total (as Se)	Silver, total (as Ag)	Thallium, total (as Tl)	Zinc, total (as Zn)
	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max
	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L
06/30/2006	3.1	0	9.6	14.9	BD	BD	0.85	BD	160
12/31/2006	BD	BD	8.1	16.9	BD	BD	0.56	BD	50
06/30/2007	BD	BD	12.7	8	BD	BD	BD	BD	9
12/31/2007	2	0.2	7.6	8.2	10	4.3	1	2	12.5
06/30/2008	2.6	BD	5.2	9	10	BD	1	2	27.4
12/31/2008	2.2	BD	8.5	7.6	10	BD	1	2	18.4
06/30/2009	BD	BD	5.5	6.4	BD	2.6	BD	BD	20.3
12/31/2009	BD	BD	6.9	7.2	BD	BD	BD	BD	18
06/30/2010	3.3	BD	5.2	4.5	BD	BD	BD	BD	23.7
12/31/2010	2	0.2	7.8	6.5	10	2.1	1	2	41.4
06/30/2011	BD	BD	7.3	7.4	22.5	5.4	BD	BD	60
12/31/2011	BD	BD	5.2	5.6	BD	BD	BD	BD	19.4

Outfall 001-Effluent Monitoring of Parameters from ARSD Sections 74:52:02:41, 74:52:02:42, and 74:52:02:44

All parameters were reported on the January 2010 DMR as Below Detection Limits.

Outfall 001- Influent Monitoring Metals Monitoring

	Antimony, total (as Sb)	Arsenic, total (as As)	Beryllium, total (as Be)	Cadmium, total (as Cd)	Chromium, total (as Cr)	Copper, total (as Cu)	Cyanide, total (as CN)	Cyanide, weak acid, dissociable
	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max
	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L
06/30/2006	BD	BD	BD	1.91	10.6	94.8	BD	BD
12/31/2006	BD	BD	BD	0.73	3.8	128.5	BD	BD
06/30/2007	BD	2.5	BD	0.54	4.4	40.2	BD	BD
12/31/2007	2.1	2	0.25	0.28	10	48.2	20	20
06/30/2008	2	3	1	1	8.9	60.7	20	20
12/31/2008	2	2	1	1	5.7	46	20	20
06/30/2009	BD	3.2	BD	BD	2.8	68.7	BD	BD
12/31/2009	BD	3.1	BD	BD	9	52.6	BD	BD
06/30/2010	BD	BD	BD	BD	3.7	55.5	BD	BD
12/31/2010	2	2	1	1	5.3	15.1	20	20
06/30/2011	BD	BD	BD	BD	BD	2.5	BD	BD
12/31/2011	BD	BD	BD	BD	4.0	55.8	BD	BD

	Lead, total (as Pb)	Mercury, total (as Hg)	Molybdenum, total (as Mo)	Nickel, total (as Ni)	Phenols	Selenium, total (as Se)	Silver, total (as Ag)	Thallium, total (as Tl)	Zinc, total (as Zn)
	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max	Daily Max
	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L	N/A ug/L
06/30/2006	5.7	0.02	14.5	16.2	47.7	3.6	6.3	BD	150
12/31/2006	15.4	BD	5.3	34.9	22	BD	6.38	BD	110
06/30/2007	2.7	BD	27.8	10.4	14.8	5.1	2.7	BD	120
12/31/2007	3.4	0.2	6.2	9.6	117	4	6.9	2	160
06/30/2008	4.4	BD	5.5	9.7	18.3	5.5	5	2	100
12/31/2008	3.7	BD	4.8	7.3	161	3	5.1	2	60
06/30/2009	BD	BD	8.9	7.4	40.1	4.8	2	BD	80
12/31/2009	3.6	BD	8.6	9.4	92.2	2.8	2.7	BD	60
06/30/2010	3.8	BD	3.5	7.9	29.4	6.6	5.8	BD	80
12/31/2010	2.6	0.2	4.1	7.2	28	2.4	1	2	15
06/30/2011	BD	BD	5.9	4.86	12	BD	BD	BD	12.7
12/31/2011	2.7	BD	3.7	6.4	10.0	BD	3.7	BD	220

Outfall 001-Influent Monitoring of Parameters from ARSD Sections 74:52:02:41, 74:52:02:42, and 74:52:02:44

All parameters, except for phenol were reported as Below Detection Limit on the January 2010 and January 2012 DMRs. The phenol data is as follows.

	Phenols
	Daily Max
	N/A ug/L
01/31/2010	23.4
01/31/2012	22

Outfall 002- Land Application

	Chloride (as Cl)		Fecal Coliform		Conductivity		Flow Rate		Ammonia (as N)	
	30 Day Avg.	Daily Max	30 Day Geo	Daily Max	30 Day Avg.	Daily Max	30 Day Avg.	Daily Max	30 Day Avg	Daily Max
	N/A mg/L	N/A mg/L	N/A #/100mL	N/A #/100mL	N/A umho/cm	N/A umho/cm	N/A Mgal/d	N/A Mgal/d	N/A mg/L	N/A mg/L
05/31/2006	208	208	10	10	1,841	1,841	1.92	1.92	4.4	4.4
06/30/2006	206	206	NR	150	1,831	1,831	0.97	2.54	2.65	2.65
07/31/2006	227	227	NR	30	1,750	1,750	2.52	5.29	0.14	0.14
08/31/2006	219	219	NR	30	1,977	1,977	1.65	4.17	0.17	0.17
04/30/2007	156	156	20	20	1,710	1,710	3.46	5.69	0.02	0.02
06/30/2007	162	162	NR	50	NS	NS	NS	NS	NS	NS
07/31/2007	156	156	20	20	1,710	1,710	3.46	5.69	0.02	0.02
08/31/2007	184	184	10	10	1,650	1,650	2.19	3.94	0.02	0.02
06/30/2008	152	152	10	10	1,500	1,500	0.63	1.41	271	2.71
07/31/2008	157	157	10	10	15.9	15.9	0.6	1.59	0.38	0.38
08/31/2008	165	165	10	10	1,620	1,620	2.21	7.94	0.03	0.03
09/30/2008	171	171	10	10	1,650	1,650	1.22	3.99	0.08	0.08
05/31/2009	160	160	BD	BD	1,590	1,590	0.64	1.03	BD	BD
06/30/2009	161	161	BD	BD	NS	NS	0.93	1.96	0.08	0.08
07/31/2011	144	144	BD	BD	NS	NS	1.06	2.04	1.25	1.25
08/31/2011	142	142	BD	BD	NS	NS	1.55	2.98	1.92	1.92
09/30/2011	155	155	BD	BD	1,770	1,770	1.54	2.52	0.34	0.34

	Total Kjedahl Nitrogen (as N)		Total Nitrates (as N)		Total Nitrates (as N)		pH		Total Phosphorus (as P)	
	30 Day Avg	Daily Max	30 Day Avg.	Daily Max	30 Day Avg	Daily Max	Daily Min	Daily Max	30 Day Avg	Daily Max
	N/A mg/L	N/A mg/L	N/A mg/L	N/A mg/L	N/A mg/L	N/A mg/L	N/A SU	N/A SU	N/A mg/L	N/A mg/L
05/31/2006	8.4	8.4	0.67	0.67	0.32	0.32	8.05	8.05	1.16	1.16
06/30/2006	5.5	5.5	0.22	0.22	0.35	0.35	8.56	8.68	0.96	0.96
07/31/2006	5	BD	0.1	BD	0.1	BD	8.54	8.76	0.47	0.47
08/31/2006	5	5	0.1	0.1	0.1	0.1	8.97	8.97	0.61	0.61
04/30/2007	2.24	2.24	0.8	0.8	0.2	0.2	8.95	8.95	0.25	0.25
06/30/2007	2.48	2.48	1.4	1.4	0.25	0.25	9.05	9.05	NS	NS
07/31/2007	224	224	0.8	0.8	0.2	0.2	8.95	8.95	0.25	0.25
08/31/2007	3.04	3.04	0.01	0.01	0.02	0.02	8.86	8.86	0.3	0.3
06/30/2008	4.92	4.92	1.8	18	0.66	66	7.85	7.85	2.4	2.4
07/31/2008	3.94	3.94	0.7	0.7	0.3	0.3	8.81	8.81	1.51	1.51
08/31/2008	3.17	3.17	0.2	0.2	0.02	0.02	9.26	9.26	0.66	0.66
09/30/2008	3.57	3.57	0.2	0.2	0.02	0.02	9.01	9.01	0.56	0.56
05/31/2009	2.98	2.98	7	7	0.52	0.52	9.15	9.15	0.81	0.81
06/30/2009	2.52	2.52	5.9	5.9	0.52	0.52	9.59	9.59	0.53	0.53
07/31/2011	3.65	3.65	BD	BD	BD	BD	8.91	8.91	0.56	0.56
08/31/2011	4.28	4.28	BD	BD	BD	BD	8.68	8.68	0.55	0.55
09/30/2011	4.15	4.15	BD	BD	0.02	0.02	8.48	8.48	0.65	0.65

	Sodium adsorption ratio		TSS		Total Sulfate (as SO_4)		Temperature	
	30 Day Avg	Daily Max	30 Day Avg	Daily Max	30 Day Avg.	Daily Max	30 Day Avg	Daily Max
	N/A Ratio	N/A Ratio	N/A mg/L	N/A mg/L	N/A mg/L	N/A mg/L	N/A ºC	N/A ºC
05/31/2006	4.24	4.24	1,150	1,150	423	423	23.1	23.1
06/30/2006	4.3	4.3	1,170	1,170	430	430	24.5	26
07/31/2006	4.58	4.58	1,170	1,170	471	471	25.8	27.5
08/31/2006	4.58	4.58	1,200	1,200	497	497	25.2	25.2
04/30/2007	3.22	3.22	1,092	1,092	486	486	25.6	25.6
06/30/2007	NS	NS	1,122	1,122	478	478	23.4	23.4
07/31/2007	322	322	1,092	1,092	486	486	25.6	25.6
08/31/2007	324	324	1,182	1,182	555	555	24.6	24.6
06/30/2008	3.12	312	1,031	1,031	388	388	23.5	23.5
07/31/2008	2.82	2.82	1,060	1,060	444	444	25.3	25.3
08/31/2008	2.99	2.99	1,098	1,098	500	500	25.8	25.8
09/30/2008	3.08	3.08	1,128	1,128	541	541	22.2	22.2
05/31/2009	3.19	3.19	1,064	1,064	434	434	17.5	17.5
06/30/2009	3.19	3.19	1,058	1,058	434	434	20.4	20.4
07/31/2011	2.41	2.41	1,225	1,225	632	632	28.7	28.7
08/31/2011	2.39	2.39	1,147	1,147	625	625	28.1	28.1
09/30/2011	2.37	2.37	1,343	1,343	686	686	20.8	20.8

Notes:

Highlighted Cells=Effluent Limit Violations. Mitchell had a limit of 10 MPN/ 100mL until a best managements plan was approved by the department. On October 1, 2006 a modification became effective that eliminated the fecal coliform limit.

NR= "Not Required" Parameter was not required to be sampled during the reporting period

BD= "Below Detection Limit"

NS= "Not Sampled"

Outfall 003

	BOD_5	Total Residual Chlorine	Fecal Coliform	Duration of discharge	Flow rate	Total Flow	Ammonia (as N)
	Daily Max	Daily Max	Daily Max	Monthly Total	Daily Max	Monthly Total	Daily Max
	N/A mg/L	N/A mg/L	N/A #/100mL	N/A days	N/A MGD	N/A Mgal	N/A mg/L
11/30/2009	236	NR	NS	0.03	NS	0.078	21.3
06/30/2010	238	NR	NS	2	NS	NS	5.74
07/31/2010	100	NR	500,000	2	NS	2.9	3.32

	Oil and Grease		pH		TSS	Temperature
	Daily Max	Visual	Daily Min	Daily Max	Daily Max	Daily Max
	N/A mg/L	N/A Y=1;N=0	N/A SU	N/A SU	N/A mg/L	N/A ºC
11/30/2009	NR	0	7.60	7.60	89	13.0
06/30/2010	NR	0	6.9	7.8	1,260	21.5
07/31/2010	NR	0	7.16	8.38	436	22.3

Outfall 004

	BOD_5	Total Residual Chlorine	Fecal Coliform	Duration of discharge	Flow rate	Total Flow	Ammonia (as N)
	Daily Max	Daily Max	Daily Max	Monthly Total	Daily Max	Monthly Total	Daily Max
	N/A mg/L	N/A mg/L	N/A #/100mL	N/A days	N/A MGD	N/A Mgal	N/A mg/L
05/31/2007	84.9	NODI 9	NODI 9	2	2.92	2.92	9.6

	Oil and Grease		pH		TSS	Temperature
	Daily Max	Visual	Daily Min	Daily Max	Daily Max	Daily Max
	N/A mg/L	N/A Y=1;N=0	N/A SU	N/A SU	N/A mg/L	N/A ºC
05/31/2007	0	0	7.39	7.78	203	14.8

Notes:

NR= "Not Required" Parameter was not required to be sampled during the reporting period

NS= "Not Sampled"

ATTACHMENT 3

Ammonia Limits Development
for the
City of Mitchell Wastewater Treatment Facility

in the James River
near
Mitchell, South Dakota

Prepared by

South Dakota Department of Environment and Natural Resources

2012

INTRODUCTION

Under Section 303(c) of the federal Clean Water Act, states have been required to develop water quality standards to protect public health and enhance water quality. In accordance with the Clean Water Act, the state of South Dakota has assigned beneficial uses to all waters of the state and developed water quality criteria to protect those uses. South Dakota's surface water quality standards and assigned beneficial uses are found in the Administrative Rules of South Dakota (ARSD) Article 74:51.

To ensure the protection of the state's surface water quality standards, the Clean Water Act authorized a permitting program for point source discharges of pollutants. The U.S. Environmental Protection Agency delegated this permitting program to the South Dakota Department of Environment and Natural Resources on December 30, 1993.

The department issues Surface Water Discharge permits containing, at a minimum, technology-based effluent limits. However, these limits are not always adequate to protect South Dakota's water quality. In those cases, the Department of Environment and Natural Resources develops water quality-based effluent limits. In accordance with the procedures and requirements outlined below, water quality-based effluent limits for ammonia will be developed for the city of Mitchell's wastewater treatment facility (WWTF). These limits will ensure the surface water quality standards for the James River near Mitchell are maintained and protected.

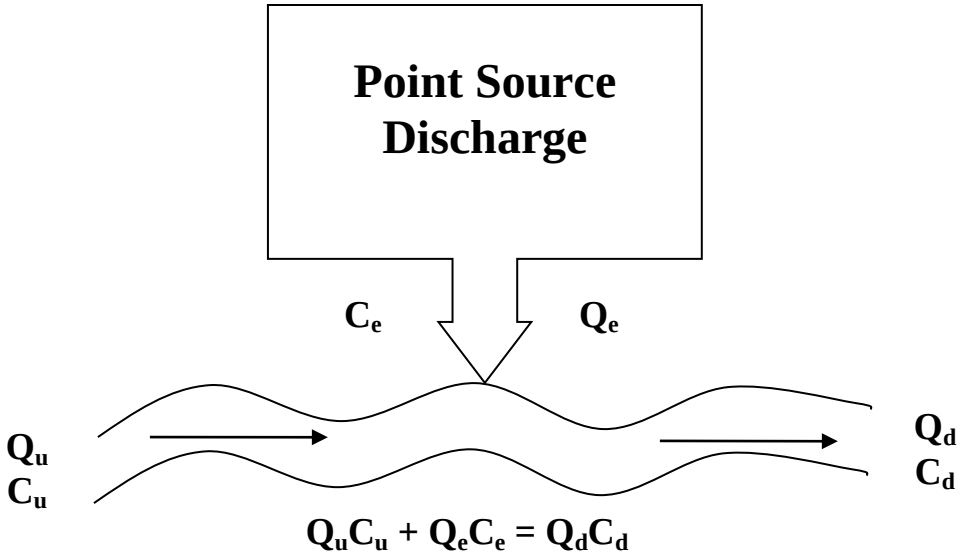
Developing the ammonia limits for the city of Mitchell is a matter of determining the maximum level of ammonia that can be present in the James River without causing the applicable South Dakota Surface Water Quality Standards (SDSWQS) for ammonia to be exceeded.

The effluent limits for ammonia are developed for critical conditions to be conservative, thereby assuring water quality standards are maintained under less critical conditions. Critical conditions are those at which the surface water quality standards are most likely to be violated. Critical conditions can be defined by several factors, including, but not limited to the following:

- stream flow (e.g., high, low);
- storm event occurrence and intensity;
- ambient water quality conditions (e.g., pH, temperature, etc.);
- diurnal variations in water column conditions;
- temporal occurrence of pollutant loadings from natural and human-induced activities;
- the presence or absence of salmonids; and
- the presence or absence of early life stages of aquatic life.

The following mass balance equation will be used to determine the ammonia limits for the city of Mitchell:

Figure 1



Where,

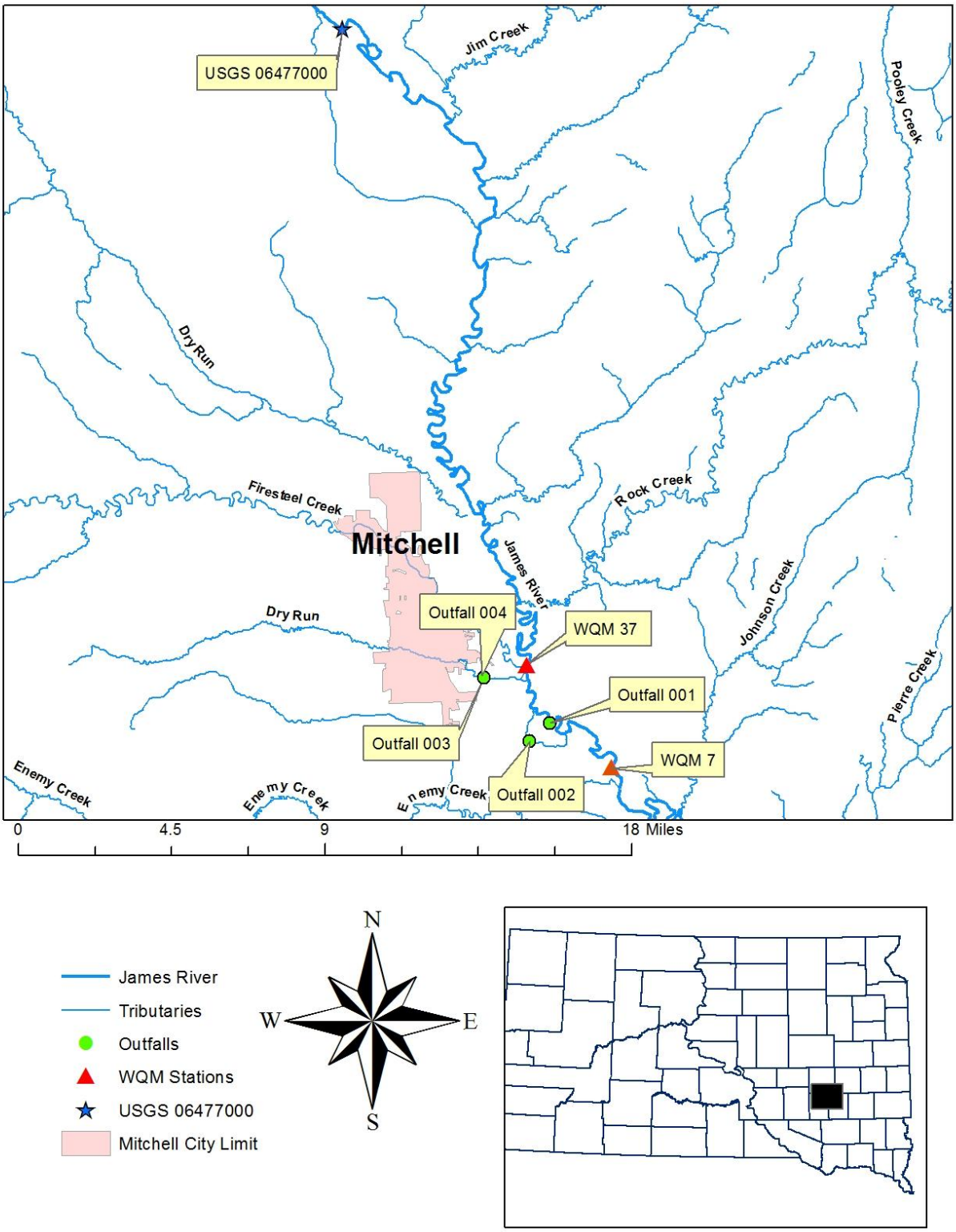
- $\mathbf{Q_u}$ = Receiving stream flow, in cubic feet per second (cfs);
- $\mathbf{C_u}$ = Ambient upstream ammonia concentration, in milligrams per liter (mg/L);
- $\mathbf{Q_e}$ = Effluent discharge flow rate, in cfs;
- $\mathbf{C_e}$ = Water quality based effluent limit for ammonia in mg/L;
- $\mathbf{Q_d}$ = Downstream flow (equal to $Q_u + Q_e$), in cfs; and
- $\mathbf{C_d}$ = Allowable instream ammonia concentration (based on the SD Surface Water Quality Standards), in mg/L.

Using the mass balance equation and the following information, the water quality-based effluent limits for ammonia can be determined for the city of Mitchell's wastewater treatment facility's discharge into the James River.

GEOGRAPHICAL EXTENT

The James River is located in the James River Basin in the eastern portion of the state. The James River Basin drains approximately 14,729 square miles of land, which is comprised largely of cropland. Figure 2 shows the James River near Mitchell.

Figure 2: The James River Watershed



Past experience has shown that, due to the decay and transformation of organic pollutants such as ammonia, most adverse effects are generally exhibited within 10 miles of pollutant loading. While this rule of thumb can certainly vary depending on the source of the pollutant, fate and transport characteristics, hydrologic conditions, and other factors, it has generally held true in past instances. Therefore, the development of the ammonia limits for the city of Mitchell's discharge into the James River will be relatively narrow in spatial extent.

ALLOWABLE INSTREAM AMMONIA CONCENTRATION (C_d)

South Dakota Surface Water Quality Standards

The SDSWQS specify the beneficial uses assigned to specific water bodies. The SDSWQS also contain specific narrative and numeric criteria that must be met to ensure the protection of each beneficial use. The James River is classified for the following beneficial uses:

(5) Warmwater semipermanent fish life propagation waters;
(8) Limited-contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters; and
(10) Irrigation waters.

Waterbodies designated in the SDSWQS with the beneficial use classification of either coldwater permanent or coldwater marginal fish life propagation are suitable for supporting salmonids. Waterbodies with the beneficial use classifications of warmwater permanent, warmwater semipermanent, or warmwater marginal fish life propagation will likely not have salmonids. The presence or absence of early life stages can be assumed based on the beneficial uses assigned to the receiving stream.

Salmonids are not expected to be present in the James River. Early life stages are expected to be present from March 1 through October 31 based on the SDSWQS (ARSD Section 74:51:01:48).

Allowable Instream Ammonia Levels

Based on the beneficial uses of the James River, the following equations can be used to determine the total allowable ammonia concentration in the receiving stream (SDSWQS, ARSD Chapter 74:51:01, Appendix A):

Equation 1: Daily Maximum (Salmonids present)

$$Cd = \frac{0.275}{(1+10^{(7.204-pH)})} + \frac{39.0}{(1+10^{(pH-7.204)})}$$

Equation 2: Daily Maximum (Salmonids NOT present)

$$Cd = \frac{0.411}{(1+10^{(7.204-pH)})} + \frac{58.4}{(1+10^{(pH-7.204)})}$$

Equation 3: 30-day Average (Early Life Stages Present)

$$Cd = \left[\frac{0.0577}{(1+10^{(7.688-pH)})} + \frac{2.487}{(1+10^{(pH-7.688)})} \right] \times MIN\left(2.85, 1.45 \times 10^{0.028(25-T)}\right)$$

Equation 4: 30-day Average (Early Life Stages Absent)

$$Cd = \left[\frac{0.0577}{(1+10^{(7.688-pH)})} + \frac{2.487}{(1+10^{(pH-7.688)})} \right] \times [1.45 \times 10^{0.028((25-MAX(T,7))}]$$

pH = the pH of the water quality sample in standard units
T = the water temperature of the sample in degrees Centigrade
MIN = use either 2.85 or the value of $1.45^{0.028*(25-T)}$, whichever is the smaller value
MAX = use either the water temperature (T) for the sample, or 7, whichever is the greater value

To develop the ammonia limits for the city of Mitchell, equations 2, 3, and 4 will be used to determine the instream ammonia concentration, C_d, allowed in the James River. C_d will be expressed as both 30-day average and daily maximum concentrations. The seasons have been determined based on the presence or absence of early life stages.

Instream Water Quality Monitoring

The department maintains a statewide network of fixed monitoring stations to gain a historic record of water quality for various streams around the state. This water quality monitoring (WQM) network consists of 151 monitoring stations, which are sampled at monthly, quarterly, or seasonal intervals. The goal of this sampling is to collect reliable water quality data that reflects actual stream conditions; to collect data to determine the effectiveness of controls on point and nonpoint sources of pollution; and to collect data to evaluate the appropriateness of current beneficial use designations.

Water quality samples are collected at two WQM stations on the James River. A description of each station is listed below. Figure 2 denotes the locations of WQM 7 and WQM 37.

WQM 7	James River near Mitchell downstream of WWTF discharge (Latitude 43.658611º, Longitude -97.918333º)
WQM 37	James River near Mitchell upstream of WWTF discharge (Latitude 43.702500º, Longitude -97.964444º)

Ambient temperature and pH were obtained from WQM 7 and ammonia was obtained from WQM 37 to represent instream conditions. The water quality information obtained from WQM 7 and WQM 37 are presented in Attachment 4. The pH and temperature data are summarized in Table 1 below; the ammonia data is summarized in Table 2.

Calculation of Allowable Instream Ammonia Concentration (C_d)

The SDSWQS specify the total ammonia concentration that is allowed at a given pH and temperature. The 50^h percentile of the pH and temperature at WQM 7 was used because it is unlikely that all critical conditions will occur at the same time and to remain consistent with the previous permit's ammonia limit calculations. This information was used to calculate the allowable instream ammonia concentrations for each season. Table 1 summarizes the allowable instream ammonia (C_d) for the James River.

Table 1: Allowable Instream Total Ammonia Concentrations for the James River

Season	Temperature (°C)	pH (s.u.)	C_d, Allowable Total Ammonia (mg/L)	
			30-Day Average	Daily Maximum
November 1 – February 29	0.56	7.90	**4.54**	**10.13**
March 1 – October 31	15.50	8.33	**1.36**	**4.45**

AMBIENT AMMONIA CONCENTRATION (C_u)

The ammonia data at WQM 37 was reviewed to determine the ambient water quality in the James River. The 50th percentile of the ammonia data was determined to ensure the ammonia standards are maintained during critical conditions. The ammonia data from WQM 37 is presented in Attachment 4. Table 2 below summarizes the 50th percentile ammonia data for each season. This data represents the ambient ammonia concentration for the James River (C_u).

Table 2: Ambient Ammonia Data for the James River

Season	Ammonia (mg/L)
November 1 – February 29	0.05
March 1 – October 31	0.02

EFFLUENT DISCHARGE FLOW RATE (Q_e)

The effluent discharge flow rate, Q_e, can be determined in several different ways. If effluent data is available for the discharger, the 50th or 80th percentile of the daily flow or 30-day average can be used. The effluent design flow rate of the wastewater treatment facility may be used as the expected effluent flow rate in the absence of actual discharge data. Alternatively, for stabilization pond systems, it may be appropriate to develop an effluent flow rate based on expected performance.

For the purposes of developing ammonia limits for the city of Mitchell, 18.53 cfs was used for Q_e based on the 50th percentile of 30-day average flow rate of the facility. The 50th percentile was used as this value has been consistent with the previous permit and the effluent flow rate from the facility has been decreasing over the last few years. See Attachment 5 for more details.

Table 3 below summarizes the effluent flow rate used in these calculations.

RECEIVING STREAM FLOW (Q_u)

The United States Geological Survey (USGS) maintains hundreds of flow monitoring sites in South Dakota. The receiving stream flow rate, Q_u, is determined from an analysis of stream flow data available, incorporating the flow considerations required by *South Dakota's Mixing Zone and Dilution Implementation Procedures*.

Critical conditions for ammonia presumably occur when stream flows are relatively low. Therefore, the ammonia limits will be developed for low stream flow conditions. Should it be determined that water quality standards are violated at other flow conditions, the permit would be reopened and new limits would be developed.

ARSD Section 74:51:01:30 specifies that surface water quality standards apply to low quality fishery waters when flows meet or exceed the minimum 7-day average low flow that can be expected to occur once every 5 years (7Q5), or 1.0 cfs, whichever is greater. The 7Q5 is therefore the minimum, or critical, flow for which the SDSWQS must be maintained, although all Surface Water Discharge permit limits remain in force below this minimum flow.

The flow in the James River has large seasonal water level fluctuations. Therefore, limits were developed for different river flow levels. If the James River has a flow of less than 100 cfs, the seasonal 7Q5 flows were used to calculate ammonia limits. The seasonal 7Q5 flows were determined using data retrieved from the USGS gauging station USGS 06478000 and a Log Pearson type III statistical analysis. The seven-day averages are calculated for the entire data set. After the averages are calculated, the data is split into the selected seasons. Analysis is then done in accordance with the EPA guidance document *Technical Guidance Manual for Performing Wasteload Allocation* to determine the seasonal 7Q5 flow. For March 1st through October 31st, the Log Pearson type III statistical analysis calculated a 7Q5 less than 0.0584 cfs, therefore 1.0 cfs was used for the 7Q5 for March through October in accordance with ARSD Section 74:51:01:30. A description of the station is listed below. Figure 2 denotes the location of the USGS gauging station.

USGS 06477000 James River near Forestburg, SD (Latitude 43.973889º, Longitude -98.070556º)

If the James River has a flow between 100 cfs and 1000 cfs, a value of 100 cfs was used for limit development. If the James River has a flow greater than 1000 cfs, a value of 1000 cfs was used in limit development.

South Dakota's water quality standards allow a zone of mixing for discharges. In accordance with the SDSWQS, chronic water quality criteria must be met at the end of the mixing zone; the acute criteria must be met at all times within the mixing zone. The mixing zone is therefore a limited portion of a water body where mixing of the effluent and receiving stream is in progress, but not complete. In some cases, the discharge will not completely mix with the entire receiving stream. There are many factors that influence the rate of mixing in a stream. A few of these

factors are the flow and velocity of the receiving stream, the flow and velocity of the effluent, the slope of the stream, and other stream characteristics.

The *South Dakota Mixing Zone and Dilution Implementation Procedures* outlines an approach for modeling the mixing zone. Using these procedures, the 7Q5 is adjusted to account for the allowable ratio of flow available in the receiving stream. This adjusted flow represents the receiving stream flow rate (Q_u).

Table 3 and Attachment 6 summarize the flow data and the determination of Q_u for the James River.

Table 3: Critical Low Flow Values for the James River

Season/James River Flows	7Q5 Low Flow (cfs)	Effluent Flow (cfs)	Ratio of Effluent to 7Q5	Allowable Ratio of 7Q5	Critical Low Flow Q_u (cfs)
November 1 – February 29					
James River Flows <100 cfs	2.10	18.53	8.8255	1.00	**2.10**
James River Flows 100 cfs – 1000 cfs	100	18.53	0.1853	0.25	**25.00**
James River Flows >1000 cfs	1000	18.53	0.0185	0.10	**100.00**
March 1 – October 31					
James River Flows <100 cfs	1.00	18.53	18.53	1.00	**1.00**
James River Flows 100 cfs – 1000 cfs	100	18.53	0.1853	0.25	**25.00**
James River Flows >1000 cfs	1000	18.53	0.0185	0.10	**100.00**

DOWNSTREAM FLOW RATE (Q_d)

The downstream flow rate, Q_d, is simply the sum of the upstream flow rate (Q_u) and the effluent flow rate (Q_e). The downstream flow rate used for the calculation of the ammonia limits for the city of Mitchell's discharge into the James River is summarized in Table 4 below.

CALCULATION OF AMMONIA LIMIT (C_e)

Each of the variables determined above is summarized in Table 4. Using the mass balance equation, the ammonia limits for the city of Mitchell's discharge into the James River can be calculated as follows:

$$Ce=\frac{(Qd*Cd)-(Qu*Cu)}{Qe}$$

The water quality-based effluent limits for ammonia for the city of Mitchell's discharge into the James River are presented in Table 4.

Table 4: Variables Calculated for Mass Balance Equation

Season	C_u, mg/L	C_d, mg/L		Q_d, cfs	Q_e, cfs	C_e, mg/L	
		30-day Average	Daily Maximum			30-Day Average	Daily Maximum
November 1 – February 29 James River Flows <100 cfs	0.05	4.54	10.13	20.63	18.53	5.0	11.3
James River Flows 100 cfs – 1000 cfs	0.05	4.54	10.13	43.53	18.53	10.6	23.7
James River Flows >1000 cfs	0.05	4.54	10.13	118.53	18.53	28.8	64.5
March 1 – October 31 James River Flows <100 cfs	0.02	1.36	4.45	19.53	18.53	1.4	4.7
James River Flows 100 cfs – 1000 cfs	0.02	1.36	4.45	43.53	18.53	3.2	10.4
James River Flows >1000 cfs	0.02	1.36	4.45	118.53	18.53	8.6	28.4

The city of Mitchell's current permit contains mass based ammonia limits. The following equation was used to convert the concentration based limits (C_e) to a mass base limit.

$$E\left(\frac{lb}{day}\right) = C_e\left(\frac{mg}{L}\right) \times Q_e\,(MGD) \times 8.34$$

Where,

E=Effluent limits in pounds per day.
8.34=conversion factor
1 MGD=1.547 cfs

Table 5: Conversion from Concentration Based Limits to Mass Based Limits

Season/James River Flows	C_e (mg/L)		Q_e (MGD)	E (lb/day)	
	30-Day Average	Daily Maximum		30-Day Average	Daily Maximum
November 1 – February 29 James River Flows <100 cfs	5.0	11.3	11.97	**504**	**1,125**
James River Flows 100 cfs – 1000 cfs	10.6	23.7	11.97	**1,059**	**2,371**
James River Flows >1000 cfs	28.8	64.5	11.97	**2,874**	**6,446**
March 1 – October 31 James River Flows <100 cfs	1.4	4.7	11.97	**143**	**468**
James River Flows 100 cfs – 1000 cfs	3.2	10.4	11.97	**316**	**1,042**
James River Flows >1000 cfs	8.6	28.4	11.97	**858**	**2,833**

The current effluent limits were compared to the limits calculated using the information presented above. A comparison of the two limits is presented in Table 5 below.

Most of the city's current limits are adequate to protect the beneficial uses and water quality criteria of the James River. Comparison of ammonia values upstream (WQM 37) and downstream (WQM 7) of the discharge also indicate the current limits are protecting the beneficial uses of the James River. These limits will be continued in the proposed permit, to prevent backsliding. For March and April, it was necessary to implement more stringent limits for the 30-day average and daily maximum when the flow rate of the James River is less than 100 cfs. The shaded values in Table 5 indicate the limits that will be proposed in the permit.

Table 5: Comparison of Current and Proposed Effluent Limits

Month/ James River Flow	Current Effluent Limits		Calculated Effluent Limits	
	30-Day Average (lb/day)	Daily Maximum (lb/day)	30-Day Average (lb/day)	Daily Maximum (lb/day)
January 1 – January 31 James River flow <100 cfs	**477**	**1,041**	504	1,125
James River flow 100 cfs - 1000 cfs	**917**	**2,091**	1,059	2,371
James River flow >1000 cfs	**1,849**	**3,239**	2,874	6,446
February 1 – February 29 James River flow <100 cfs	**477**	**1,041**	504	1,125
James River flow 100 cfs - 100 cfs	**917**	**2,091**	1,059	2,371

Month/ James River Flow	Current Effluent Limits		Calculated Effluent Limits	
	30-Day Average (lb/day)	Daily Maximum (lb/day)	30-Day Average (lb/day)	Daily Maximum (lb/day)
James River flow >1000 cfs	**1,849**	**3,239**	2,874	6,446
March 1 – March 31 James River flow <100 cfs	194	601	**143**	**468**
James River flow 100 cfs - 1000 cfs	**309**	**1,015**	316	1,042
James River flow >1000 cfs	**604**	**2,523**	858	2,833
April 1 – April 30 James River flow <100 cfs	194	546	**143**	**468**
James River flow 100 cfs - 1000 cfs	**309**	**655**	316	1,042
James River flow >1000 cfs	**594**	**1,068**	858	2,833
May 1 – May 31 James River flow <100 cfs	**80**	**141**	143	468
James River flow 100 cfs - 1000 cfs	**192**	**354**	316	1,042
James River flow >1000 cfs	**594**	**1,068**	858	2,833
June 1 – June 30 James River flow <100 cfs	**80**	**141**	143	468
James River flow 100 cfs - 1000 cfs	**192**	**354**	316	1,042
James River flow >1000 cfs	**306**	**572**	858	2,833
July 1 – July 31 James River flow <100 cfs	**80**	**141**	143	468
James River flow 100 cfs - 1000 cfs	**192**	**354**	316	1,042
James River flow >1000 cfs	**306**	**572**	858	2,833
August 1 – August 31 James River flow <100 cfs	**80**	**141**	143	468
James River flow 100 cfs - 1000 cfs	**192**	**354**	316	1,042
James River flow >1000 cfs	**306**	**572**	858	2,833
September 1 – September 30 James River flow <100 cfs	**107**	**201**	143	468
James River flow 100 cfs - 1000 cfs	**205**	**522**	316	1,042
James River flow >1000 cfs	**323**	**849**	858	2,833
October 1 – October 31 James River flow <100 cfs	**107**	**201**	143	468

Month/ James River Flow	Current Effluent Limits		Calculated Effluent Limits	
	30-Day Average (lb/day)	Daily Maximum (lb/day)	30-Day Average (lb/day)	Daily Maximum (lb/day)
James River flow 100 cfs - 1000 cfs	**205**	**522**	316	1,042
James River flow >1000 cfs	**323**	**849**	858	2,833
November 1 – November 30 James River flow <100 cfs	**115**	**201**	504	1,125
James River flow 100 cfs - 1000 cfs	**289**	**522**	1,059	2,371
James River flow >1000 cfs	**466**	**849**	2,874	6,446
December 1 – December 31 James River flow <100 cfs	**477**	**1,041**	504	1,125
James River flow 100 cfs - 1000 cfs	**917**	**2,091**	1,059	2,371
James River flow >1000 cfs	**1,849**	**3,239**	2,874	6,446

ATTACHMENT 4

Water Quality Data

WQM 7 Reduced Data (for pH and Temperature)

November through February

Sample Date	Sample Time	pH (s.u.)	Temperature (°C)
11/03/1976	14:40	8.0	6.11
12/11/1974	16:10		1.00
01/28/1975	14:40		0.00
01/29/1975	08:45		0.00
02/11/1975	15:30		0.00
12/15/1975	17:00		-0.50
01/19/1976	14:15		0.00
02/11/1976	16:20		2.22
12/21/1976	14:45	7.0	0.00
01/04/1977	08:00		0.00
02/08/1977	10:45		0.00
11/29/1977	10:00	7.8	0.56
12/29/1977	14:00	7.5	-0.56
01/23/1978	08:00	6.6	-0.56
12/20/1978	08:00	8.0	1.11
01/22/1979	13:20	7.9	0.00
02/26/1979	13:40	7.9	0.56
11/14/1979	10:25	8.4	4.44
12/04/1979	12:41	7.2	0.00
01/09/1980	13:42	7.5	0.00
02/27/1980	11:28		0.00
12/17/1980	08:00	7.3	3.33
12/30/1980	12:15	8.0	1.11
01/21/1981	10:30	7.7	0.00
02/18/1981	08:15	7.5	-1.11
02/23/1981	10:15	6.7	0.56
11/17/1981	16:55		8.89
01/19/1983	13:20	7.6	0.00
01/18/1984	14:00	7.25	0.56
01/24/1985	15:30		0.00
01/22/1986	12:15	7.3	0.00
01/21/1987	12:15	8.0	0.00
01/20/1988	08:00	7.2	0.56
11/03/1988	08:35		6.70
01/19/1989	12:50	8.24	2.20
02/22/1990	08:00	8.59	0.56
01/29/1991	11:30	8.0	1.67
01/27/1992	10:00	8.32	0.00
01/26/1993	08:45	7.49	0.56
01/24/1994	12:15	7.43	1.67
01/31/1995	10:15		2.22
01/23/1996	11:15	7.96	1.11
01/21/1997	08:00	7.22	2.22
01/30/1998	08:00		0.56
01/28/1999	08:00	7.84	0.40

Sample Date	Sample Time	pH (s.u.)	Temperature (°C)
01/31/2000	08:00	8.07	1.00
01/04/2001	08:00	8.16	2.50
01/28/2002	08:00	8.11	0.50
01/08/2003	08:00	8.7	2.00
01/14/2004	12:20	8.7	2.00
01/18/2005	12:30	8.1	1.00
01/24/2006	15:30	8.2	1.00
01/24/2007	12:10	7.5	1.00
01/15/2008	16:35	8.0	0.00
02/18/2009	16:50	8.1	1.00
11/19/2009	14:00	7.9	4.00
02/25/2010	16:30		1.00
11/17/2010	15:25	8.2	5.00
02/16/2011	16:30	7.4	1.00
Average		**7.78**	**1.21**
50th Percentile		**7.90**	**0.56**
80th Percentile		**8.14**	**2.08**

March through October

Sample Date	Sample Time	pH (s.u.)	Temperature (°C)
07/30/1974	12:30		24.00
04/28/1975	15:00		14.40
04/29/1975	11:20		12.20
06/10/1975	08:00		18.90
07/14/1975	10:10		23.90
09/22/1975	12:45		14.40
10/14/1975	09:15		10.50
03/08/1976	16:25		1.67
04/20/1976	15:15		12.80
05/20/1976	11:15		19.40
06/29/1976	15:00		23.30
07/21/1976	14:50	8.4	
08/25/1976	14:30	7.9	27.80
09/15/1976	14:50	8.0	18.90
10/20/1976	15:30	8.8	
03/08/1977	10:20	5.8	0.00
04/06/1977	10:45	8.0	4.44
05/11/1977	10:00	9.0	18.90
06/08/1977	10:45	9.0	24.40
07/06/1977	10:30	8.5	27.80
08/03/1977	11:15	9.5	23.30
09/07/1977	11:00	9.0	22.20
10/25/1977	11:00	8.7	9.40
03/01/1978	08:00	6.8	0.00
03/02/1978	08:00	6.9	0.56
03/30/1978	08:00	7.0	10.00
04/25/1978	08:00	7.5	9.40
05/23/1978	08:00	7.7	21.70

Sample Date	Sample Time	pH (s.u.)	Temperature (°C)
06/27/1978	08:00	7.9	26.70
07/26/1978	08:00	7.8	27.80
08/21/1978	08:00	7.8	24.40
10/03/1978	08:00	8.4	16.11
10/25/1978	08:00	8.2	10.00
03/28/1979	13:00	8.1	3.33
04/25/1979	13:30	9.9	11.10
05/31/1979	12:45	7.5	20.00
06/26/1979	09:50	7.7	25.60
07/30/1979	13:30	7.9	28.30
08/27/1979	15:25	8.4	26.70
09/25/1979	11:20	8.4	21.10
10/31/1979	12:15	9.1	8.90
03/24/1980	08:00	8.7	3.89
04/30/1980	11:00	8.3	18.30
05/29/1980	12:27	8.2	22.20
06/25/1980	10:45	8.5	25.60
08/25/1980	09:45	8.5	26.10
09/29/1980	14:30	8.5	18.30
10/27/1980	09:45		3.30
03/17/1981	16:00	7.9	6.11
03/25/1981	11:00	9.2	10.00
04/29/1981	10:30	8.0	17.20
05/28/1981	09:45	8.4	19.40
06/24/1981	10:30	8.4	22.20
04/21/1982	08:15	8.8	9.44
05/19/1982	07:30	7.9	17.78
06/22/1982	15:45	8.05	23.89
07/19/1982	21:15	8.4	31.10
10/19/1982	13:15	8.5	7.78
04/27/1983	11:00	7.9	13.30
07/18/1983	12:30	8.35	28.30
10/19/1983	14:05	7.95	11.10
04/18/1984	15:45	8.25	14.40
07/18/1984	16:00	7.45	28.00
10/17/1984	15:45	8.35	10.00
04/17/1985	14:30	8.5	16.00
07/17/1985	13:30	8.38	26.00
10/23/1985	12:45	7.77	12.40
04/23/1986	11:00	7.44	13.00
07/16/1986	13:00	7.99	29.00
10/22/1986	11:00	8.25	13.90
04/15/1987	10:45	8.55	11.10
07/15/1987	11:00		24.00
10/21/1987	10:00	9.11	5.60
04/20/1988	08:00		13.90
07/21/1988	11:15	8.84	26.70
04/19/1989	11:40		13.30

Sample Date	Sample Time	pH (s.u.)	Temperature (°C)
10/19/1989	12:30	8.5	7.22
04/18/1990	12:20	8.51	10.00
07/18/1990	10:40	8.5	25.60
10/22/1990	13:45	8.8	7.78
04/23/1991	11:00	8.56	11.70
07/22/1991	09:30	8.25	28.90
10/22/1991	11:15	8.67	11.70
04/20/1992	10:20	8.74	6.60
10/28/1992	15:45	8.45	12.40
04/27/1993	08:00	7.75	13.90
07/26/1993	11:00	7.85	23.90
10/25/1993	10:45	8.31	12.22
04/25/1994	11:40	8.37	20.00
07/26/1994	11:35	8.12	24.44
10/24/1994	10:50	8.53	11.11
04/24/1995	12:30		11.11
10/30/1995	10:35		7.30
04/22/1996	11:05	8.51	11.67
07/23/1996	14:05	8.01	28.33
10/28/1996	11:15	8.42	9.44
07/27/1997	08:00	8.04	26.67
10/21/1997	08:00	8.45	12.78
07/13/1998	08:00	8.21	28.89
10/27/1998	08:00	8.09	12.80
04/14/1999	08:00	8.23	10.70
07/29/1999	08:00	8.08	36.80
10/28/1999	08:00	6.86	9.40
04/24/2000	08:00	8.12	20.00
07/26/2000	08:00	8.23	27.30
10/24/2000	08:00	8.4	17.80
04/04/2001	08:00	7.77	3.50
07/17/2001	08:00	7.78	27.50
10/15/2001	08:00	8.55	10.00
04/23/2002	08:00	8.63	15.50
07/15/2002	08:00	8.78	29.00
10/23/2002	08:00	8.51	7.00
04/23/2003	11:05	8.6	13.00
07/22/2003	11:40	8.3	25.00
10/29/2003	08:45	8.7	6.00
04/27/2004	12:15	8.6	15.00
07/21/2004	17:45	7.5	28.00
10/13/2004	16:50	8.6	14.00
04/19/2005	16:40	8.4	19.00
07/19/2005	15:55	7.5	28.00
10/20/2005	16:35	8.6	12.00
04/18/2006	10:25	7.9	13.00
07/25/2006	16:45	8.7	27.00
10/18/2006	16:20	8.4	9.00

Sample Date	Sample Time	pH (s.u.)	Temperature (°C)
04/18/2007	16:55	9.03	13.00
05/21/2007	11:45	7.45	22.00
07/23/2007	11:50	7.4	28.00
10/17/2007	17:10	8.5	11.00
04/23/2008	18:10	8.6	14.00
07/02/2008	17:00	8.3	25.00
10/23/2008	16:40	8.7	8.00
05/21/2009	17:50	7.9	20.00
08/19/2009	18:10	8.1	24.00
05/12/2010	14:10	8.1	9.00
08/18/2010	17:50	8.0	25.00
05/23/2011	13:05	8.2	18.00
08/08/2011	18:35	8.1	27.00
	Average	**8.24**	**16.90**
	50th Percentile	**8.33**	**15.50**
	80th Percentile	**8.60**	**25.60**

Notes:
Blank cells= data was not collected for that parameter. These were not used in the average and percentile calculations.
Highlighted Cells = Values used for WQBEL calculations.

WQM 37 Reduced Data (For Ammonia)
November through February

Sample Date	Sample Time	Ammonia (as N) reported	Adjusted Ammonia (as N)
01/23/1996	10:25	0.09	0.09
01/21/1997	08:00	0.46	0.46
01/30/1998	08:00	0.19	0.19
01/28/1999	08:00	0.07	0.07
01/31/2000	08:00	Non-detect	0.02
01/04/2001	08:00	0.17	0.17
01/28/2002	08:00	Non-detect	0.02
01/08/2003	13:10	Non-detect	0.02
01/14/2004	11:15	Non-detect	0.02
01/18/2005	11:40	Non-detect	0.02
01/24/2006	14:45	Non-detect	0.02
01/24/2007	13:20	<0.02	0.02
01/15/2008	15:50	<0.02	0.02
02/18/2009	16:00	0.17	0.17
11/19/2009	12:50	<0.05	0.05
02/25/2010	15:30	0.48	0.48
11/17/2010	14:50	<0.05	0.05
02/16/2011	15:35	0.27	0.27
		Average	**0.12**
		50th Percentile	**0.05**
		80th Percentile	**0.18**

March through October

Sample Date	Sample Time	Ammonia (as N) reported	Adjusted Ammonia (as N)
04/22/1996	10:15	Non-detect	0.02
07/23/1996	13:30	0.05	0.05
10/28/1996	10:40	Non-detect	0.02
07/27/1997	08:00	Non-detect	0.02
10/21/1997	08:00	Non-detect	0.02
04/28/1998	08:00	non-detect	0.02
07/13/1998	08:00	non-detect	0.02
10/27/1998	08:00	Non-detect	0.02
04/14/1999	08:00	Non-detect	0.02
07/29/1999	08:00	Non-detect	0.02
10/28/1999	08:00	Non-detect	0.02
04/24/2000	08:00	Non-detect	0.02
07/26/2000	08:00	Non-detect	0.02
10/24/2000	08:00	Non-detect	0.02
04/04/2001	08:00	0.82	0.82
07/17/2001	08:00	0.07	0.07
10/15/2001	08:00	Non-detect	0.02
04/23/2002	08:00	Non-detect	0.02
07/15/2002	08:00	0.06	0.06
10/23/2002	08:00	Non-detect	0.02
04/23/2003	12:05	Non-detect	0.02
07/22/2003	10:55	Non-detect	0.02
10/29/2003	10:00	Non-detect	0.02
04/27/2004	11:20	Non-detect	0.02
10/13/2004	17:50	Non-detect	0.02
04/19/2005	15:45	Non-detect	0.02
07/19/2005	15:20	Non-detect	0.02
10/20/2005	15:30	Non-detect	0.02
04/18/2006	11:30	Non-detect	0.02
07/25/2006	15:35	<0.02	0.02
10/18/2006	15:15	<0.02	0.02
04/18/2007	15:50	<0.02	0.02
05/21/2007	12:50	<0.02	0.02
07/23/2007	12:50	<0.02	0.02
10/17/2007	16:40	<0.02	0.02
04/23/2008	17:35	<0.02	0.02
07/02/2008	16:00	<0.02	0.02
10/23/2008	16:00	<0.02	0.02
05/21/2009	17:00	<0.05	0.05
08/19/2009	17:00	<0.05	0.05
05/12/2010	13:20	<0.05	0.05
08/18/2010	17:05	<0.05	0.05
05/23/2011	11:40	<0.05	0.05
08/08/2011	17:45	<0.05	0.05
		Average	**0.05**
		50th Percentile	**0.02**

80th Percentile	**0.05**

WQM 7 Ammonia values (for downstream comparison)

November through February

Sample Date	Sample Time	Ammonia (as N) Reported	Adjusted Ammonia (as N)
01/23/1996	11:15	0.08	0.08
01/21/1997	08:00	0.44	0.44
01/30/1998	08:00	0.18	0.18
01/28/1999	08:00	0.09	0.09
01/31/2000	08:00	Non-detect	0.02
01/04/2001	08:00	0.17	0.17
01/28/2002	08:00	Non-detect	0.02
01/08/2003	08:00	Non-detect	0.02
01/14/2004	12:20	Non-detect	0.02
01/18/2005	12:30	0.05	0.05
01/24/2006	15:30	Non-detect	0.02
01/24/2007	12:10	0.04	0.04
01/15/2008	16:35	<0.02	0.02
02/18/2009	16:50	0.08	0.08
11/19/2009	14:00	<0.05	0.05
02/25/2010	16:30	0.53	0.53
11/17/2010	15:25	<0.05	0.05
02/16/2011	16:30	0.29	0.29
		Average	**0.12**
		50th Percentile	**0.05**
		80th Percentile	**0.18**

March through October

Sample Date	Sample Time	Ammonia (as N) Reported	Adjusted Ammonia (as N)
04/22/1996	11:05	0.03	0.03
07/23/1996	14:05	0.04	0.04
10/28/1996	11:15	0.11	0.11
04/29/1997	08:00	Non-detect	0.02
07/27/1997	08:00	Non-detect	0.02
10/21/1997	08:00	Non-detect	0.02
07/13/1998	08:00	non-detect	0.02
10/27/1998	08:00	Non-detect	0.02
04/14/1999	08:00	Non-detect	0.02
07/29/1999	08:00	Non-detect	0.02
10/28/1999	08:00	Non-detect	0.02
04/24/2000	08:00	Non-detect	0.02
07/26/2000	08:00	0.04	0.04
10/24/2000	08:00	Non-detect	0.02
04/04/2001	08:00	0.84	0.84
07/17/2001	08:00	0.16	0.16
10/15/2001	08:00	Non-detect	0.02
04/23/2002	08:00	Non-detect	0.02
07/15/2002	08:00	0.04	0.04
10/23/2002	08:00	Non-detect	0.02

Sample Date	Sample Time	Ammonia (as N) Reported	Adjusted Ammonia (as N)
04/23/2003	11:05	Non-detect	0.02
07/22/2003	11:40	Non-detect	0.02
10/29/2003	08:45	Non-detect	0.02
04/27/2004	12:15	Non-detect	0.02
07/21/2004	17:45	Non-detect	0.02
10/13/2004	16:50	Non-detect	0.02
04/19/2005	16:40	Non-detect	0.02
07/19/2005	15:55	Non-detect	0.02
10/20/2005	16:35	Non-detect	0.02
04/18/2006	10:25	Non-detect	0.02
07/25/2006	16:45	<0.02	0.02
10/18/2006	16:20	<0.02	0.02
04/18/2007	16:55	<0.02	0.02
05/21/2007	11:45	<0.02	0.02
07/23/2007	11:50	<0.02	0.02
10/17/2007	17:10	<0.02	0.02
04/23/2008	18:10	<0.02	0.02
07/02/2008	17:00	<0.02	0.02
10/23/2008	16:40	<0.02	0.02
05/21/2009	17:50	<0.05	0.05
08/19/2009	18:10	<0.05	0.05
05/12/2010	14:10	<0.05	0.05
08/18/2010	17:50	<0.05	0.05
05/23/2011	13:05	<0.05	0.05
08/08/2011	18:35	<0.05	0.05
		Average	**0.05**
		50th Percentile	**0.02**
		80th Percentile	**0.04**

Note: EPA considers the analytical detection limit for ammonia to be 0.02 mg/L. If no ammonia was detected, a value of 0.02 mg/L was entered as the adjusted ammonia and used for calculation purposes.

ATTACHMENT 5

Point Source Dischargers Flow Rate

Raw and Reduced Effluent Flow Data

	Flow Rate	
	30 Day Avg.	Daily Max
	MGD	MGD
04/30/2006	11.57	19.71
11/30/2006	7.02	11.13
12/31/2006	1.37	4.33
06/30/2007	13.22	15.03
12/31/2007	12.85	15.94
05/31/2008	4.88	5
06/30/2008	8.63	12.31
12/31/2008	10.48	16
06/30/2009	13.49	15.51
11/30/2009	13.53	15.82
04/30/2010	12.98	13.94
10/31/2010	12.85	14.12
11/30/2010	11.81	14.06
05/31/2011	13.84	14.07
06/30/2011	11.97	13.88
11/30/2011	13.87	14.33
12/31/2011	10.32	14.2
Average	10.86	13.49
50th Percentile	11.97	14.12
50th Percentile (cfs)	**18.53**	**21.86**
80th Percentile	13.44	15.76
80th Percentile (cfs)	20.80	24.39

*****The 50th percentile of the 30-Day Average in cfs was used in the calculations.

ATTACHMENT 6

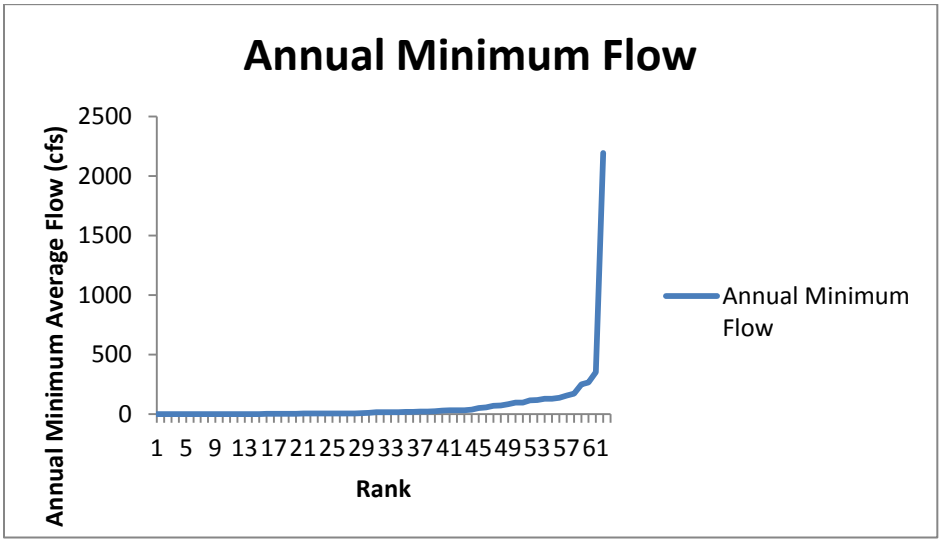
Receiving Stream Flow Data

RECEIVING STREAMFLOW DATA
USGS 06477000 Gauging Station

Statistics

7Q5	Standard Deviation	Skew	z factor	k factor	Season
2.0996	3.482969	-3.062781	-0.839527	-0.387433	1
0.0584	5.57875	-1.899771	-0.839527	-0.61425	2

Season 1 (November 30 – February 29)

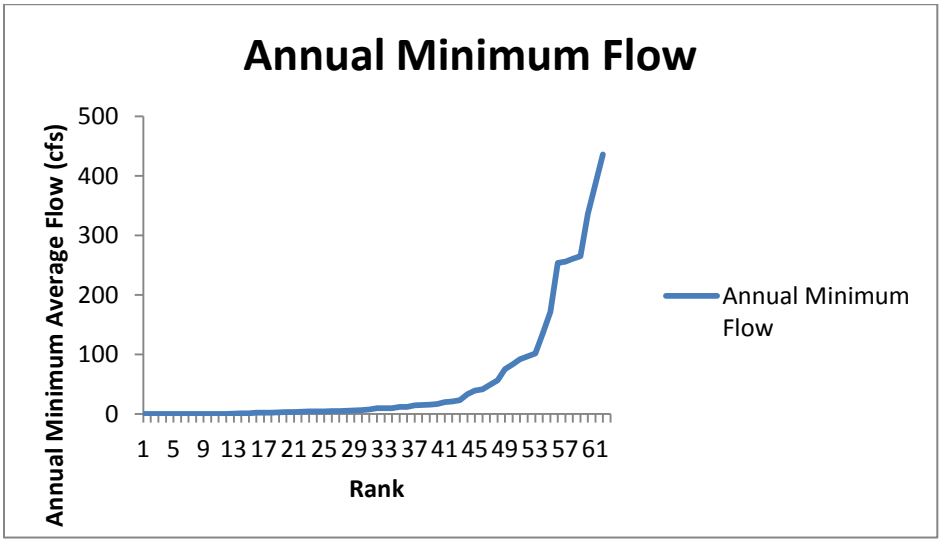


Year	Rank	Annual Minimum Flow	Log Flow
1976	1	0.000001	-13.8155
1981	2	0.000001	-13.8155
1977	3	0.245714	-1.4036
1955	4	0.342857	-1.0704
1958	5	0.714286	-0.3365
1988	6	1	0
1990	7	1	0
1989	8	1.142857	0.1335
1970	9	1.242857	0.2174
1959	10	1.3	0.2624
1980	11	1.342857	0.2948
1974	12	1.357143	0.3054
1961	13	1.385714	0.3262
1960	14	1.5	0.4055
1973	15	1.785714	0.5798
1956	16	2.142857	0.7621
1964	17	2.2	0.7885

Year	Rank	Annual Minimum Flow	Log Flow
1967	18	2.714286	0.9985
1953	19	3.714286	1.3122
1952	20	3.785714	1.3312
1991	21	4.571429	1.5198
1968	22	5	1.6094
1954	23	5.428571	1.6917
1950	24	6.142857	1.8153
2006	25	6.628571	1.8914
1984	26	7	1.9459
1978	27	7.1	1.9601
1963	28	7.142857	1.9661
1951	29	9.428571	2.2437
1985	30	11.428571	2.4361
1971	31	15.571429	2.7454
1982	32	16.142857	2.7815
1992	33	16.142857	2.7815
1983	34	17.285714	2.8499
1957	35	20.285714	3.0099
1979	36	20.285714	3.0099
1966	37	21.714286	3.078
1972	38	22.714286	3.123
1987	39	25	3.2189
1965	40	30	3.4012
1962	41	32.142857	3.4702
1969	42	32.428571	3.479
2003	43	34	3.5264
2002	44	38.285714	3.6451
1996	45	52.857143	3.9676
1975	46	55.714286	4.0202
2004	47	71.428571	4.2687
2007	48	72.571429	4.2846
1994	49	84.285714	4.4342
2000	50	97.428571	4.5791
1986	51	98.571429	4.5908
2001	52	114.71429	4.7424
2008	53	120	4.7875
1999	54	128.57143	4.8565
1995	55	130	4.8675

Year	Rank	Annual Minimum Flow	Log Flow
2005	56	136.42857	4.9158
1997	57	155.71429	5.048
2010	58	171.42857	5.1442
1993	59	250	5.5215
2009	60	267.14286	5.5878
1998	61	352.85714	5.8661
2011	62	2192.8571	7.693

Season 2 (March 1 – October 31)



Year	Rank	Annual Minimum Flow	Log Flow
1959	1	0.000001	-13.8155
1961	2	0.000001	-13.8155
1976	3	0.000001	-13.8155
1977	4	0.000001	-13.8155
1980	5	0.000001	-13.8155
1981	6	0.000001	-13.8155
1988	7	0.000001	-13.8155
1970	8	0.004286	-5.4524
1990	9	0.067143	-2.7009
1958	10	0.171429	-1.7636
1955	11	0.214286	-1.5404

Year	Rank	Annual Minimum Flow	Log Flow
1978	12	0.367143	-1.002
1989	13	0.83	-0.1863
1965	14	1.014286	0.0142
1973	15	1.15	0.1398
1964	16	2.2	0.7885
1956	17	2.314286	0.8391
1960	18	2.342857	0.8514
1968	19	2.842857	1.0448
1963	20	3.114286	1.136
1991	21	3.385714	1.2196
1952	22	3.714286	1.3122
1954	23	4.242857	1.4452
1957	24	4.271429	1.4519
1975	25	4.528571	1.5104
1962	26	4.857143	1.5805
1992	27	5.042857	1.618
1985	28	5.3	1.6677
1950	29	6.142857	1.8153
1979	30	6.514286	1.874
1974	31	7.442857	2.0073
1982	32	9.542857	2.2558
1967	33	9.8	2.2824
1951	34	10	2.3026
1986	35	11.714286	2.4608
1969	36	11.857143	2.4729
1971	37	14.428571	2.6692
1972	38	15.285714	2.7269
2006	39	15.571429	2.7454
2003	40	17	2.8332
2007	41	19.857143	2.9886
1953	42	21	3.0445
1993	43	23.285714	3.1478
2002	44	33.571429	3.5137
1984	45	39.142857	3.6672
1966	46	41.428571	3.724
1997	47	48.857143	3.8889
1983	48	56.714286	4.038
2005	49	75.428571	4.3232

Year	Rank	Annual Minimum Flow	Log Flow
2004	50	83.571429	4.4257
2008	51	92.142857	4.5233
2001	52	96.571429	4.5703
1987	53	101.85714	4.6236
2000	54	135	4.9053
2011	55	171.42857	5.1442
1998	56	253.85714	5.5368
1994	57	255.71429	5.5441
1995	58	260.71429	5.5634
2010	59	265	5.5797
2009	60	335.71429	5.8163
1996	61	387.14286	5.9588
1999	62	435.71429	6.077

ATTACHMENT 7

Reasonable Potential Analysis

Reasonable Potential Analysis-Chronic Metals

City of Mitchell

February 8, 2012

South Dakota Department of Environment and Natural Resources

Pollutant[6]

DMR Date	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Zn
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
06/30/2006	2	57.05	3.8	37.7	3.1	0	14.9	2	160
12/31/2006	2	1	2	29.2	2	0	16.9	2	50
06/30/2007	2.4	1	2	3.6	2	0	8	2	9
12/31/2007	2	1	9.4	8	2	0	8.2	4.3	12.5
06/30/2008	2	1	2.3	23.5	2.6	0	9	2	27.4
12/31/2008	2.8	1	2.4	33.5	2.2	0	7.6	2	18.4
06/30/2009	2.9	1	2	35.7	2	0	6.4	2.6	20.3
12/31/2009	2	1	2	6.8	2	0	7.2	2	18
06/30/2010	2	1	2	41.3	2.3	0	4.5	2	23.7
12/31/2010	2	1	2	15.1	2	0	6.5	2.1	41.4
06/30/2011	2	1.65	2	11.3	2	0	7.4	5.4	60
12/31/2011	2	1	2	2.3	2	0	5.6	2	19.4

n	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Mean	2.18	5.73	2.83	20.67	2.18	0.00	8.52	2.53	38.34
Variance	0.11	261.28	4.55	207.95	0.12	0.00	13.51	1.26	1706.70
Std. Dev.	0.34	16.16	2.13	14.42	0.34	0.00	3.68	1.12	41.31
Maximum	2.90	57.05	9.40	41.30	3.10	0.00	16.90	5.40	160.00
Coefficient of Variation[1]	0.15	2.82	0.76	0.70	0.16	0.00	0.43	0.44	1.08
Dilution factor[2]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Multiplying factor[3]	1.14	3.66	1.80	1.74	1.15	1.00	1.44	1.45	2.16
Highest Reasonable[4] Potential Concentration	3.32	208.76	16.93	71.70	3.55	0.00	24.27	7.82	345.13
Hardness	348.00	348.00	348.00	348.00	348.00	348.00	348.00	348.00	348.00
SDSWQ Standard[5]	150.00	0.58	11.00	25.99	9.48	0.77	149.36	4.60	339.84
Reasonable Potential	NO	**YES**	**YES**	**YES**	NO	NO	NO	**YES**	**YES**

Reasonable Potential Analysis-Acute Metals

City of Mitchell

February 8, 2012

South Dakota Department of Environment and Natural Resources

	Pollutant[6]									
DMR Date	**As**	**Cd**	**Cr**	**Cu**	**Pb**	**Hg**	**Ni**	**Se**	**Ag**	**Zn**
	ug/L	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
06/30/2006	2	57.05	3.8	37.7	3.1	0	14.9	2	1	160
12/31/2006	2	1	2	29.2	2	0	16.9	2	1	50
06/30/2007	2.4	1	2	3.6	2	0	8	2	1	9
12/31/2007	2	1	9.4	8	2	0	8.2	4.3	1	12.5
06/30/2008	2	1	2.3	23.5	2.6	0	9	2	1	27.4
12/31/2008	2.8	1	2.4	33.5	2.2	0	7.6	2	1	18.4
06/30/2009	2.9	1	2	35.7	2	0	6.4	2.6	1	20.3
12/31/2009	2	1	2	6.8	2	0	7.2	2	1	18
06/30/2010	2	1	2	41.3	2.3	0	4.5	2	1	23.7
12/31/2010	2	1	2	15.1	2	0	6.5	2.1	1	41.4
06/30/2011	2	1.65	2	11.3	2	0	7.4	5.4	1	60
12/31/2011	2	1	2	2.3	2	0	5.6	2	1	19.4

n	12	12	12	12	12	12	12	12	12	12
Mean	2.18	5.73	2.83	20.67	2.18	0.00	8.52	2.53	1.00	38.34
Variance	0.11	261.28	4.55	207.95	0.12	0.00	13.51	1.26	0.00	1,706.70
Std. Dev.	0.34	16.16	2.13	14.42	0.34	0.00	3.68	1.12	0.00	41.31
Maximum	2.9	57.05	9.4	41.3	3.1	0	16.9	5.4	1	160
Coefficient of Variation[1]	0.15	2.82	0.76	0.70	0.16	0.00	0.43	0.44	0.00	1.08
Dilution factor[2]	1	1	1	1	1	1	1	1	1	1
Multiplying factor[3]	1.1	3.7	1.8	1.7	1.1	1.0	1.4	1.4	1.0	2.2
Highest Reasonable[4] Potential Concentration	3.32	208.76	16.93	71.70	3.55	0.00	24.27	7.82	1.00	345.13
Hardness	348	348	348	348	348	348	348	348	348	348
SDSWQ Standard[5]	340.00	6.76	16.00	43.52	243.33	1.40	1344.75	12.82	27.47	337.08
Reasonable Potential	NO	**YES**	**YES**	**YES**	NO	NO	NO	NO	NO	**YES**

Notes:

[1] The coefficient of variation where n>10 is calculated as standard deviation/mean. When n<10, the coefficient of variation is estimated to be 0.6.

[2] The dilution factor was assumed to be 1, so that the standards are met end of pipe.

[3] The multiplying factor is computed in accordance with EPA's reasonable potential determination, pages 56-57, *Technical Support Document for Water Quality-based Toxics Control*, March 1991.

[4] The maximum observed effluent concentration is multiplied by this multiplying factor to determine the highest effluent concentration which can reasonably be expected, based on the observed data, a 99% confidence level, and a 95% probability basis.

[5] The standards are based on the dissolved portion of metals. However, to be conservative, the reasonable potential analysis is based on the total recoverable portion of the metals. Any effluent limits developed in response to this analysis will also be based on total recoverable metals. (See ARSD 74:52:03:16). The Chromium standard is based on the hexavalent chromium standard (Cr VI).

[6] Pollutants measured at non-detect levels were assumed to be present at the level of detection, except for mercury, in which zero was assumed.

Hardness Data from WQM 7

Sample Date	Sample Time	Hardness (mg/L)
09/19/1974	15:00	415.29
09/24/1974	08:30	417
10/23/1974	11:30	453
11/13/1974	11:30	491.79
12/11/1974	16:10	601
01/28/1975	14:40	727
01/29/1975	08:45	720
01/30/1975	08:45	691
02/11/1975	15:30	796
03/19/1975	11:15	653
04/28/1975	15:00	376
04/29/1975	11:20	372
04/30/1975	11:00	382
05/20/1975	13:40	376
06/10/1975	08:00	253
07/14/1975	10:10	265
08/13/1975	08:00	254
09/22/1975	12:45	272
10/14/1975	09:15	292
11/02/1975	17:00	289
12/15/1975	17:00	287
01/19/1976	14:15	416
02/11/1976	16:20	410
03/08/1976	16:25	368
04/20/1976	15:15	310
05/20/1976	11:15	278
06/29/1976	15:00	300
07/21/1976	14:50	358
08/25/1976	14:30	425
09/15/1976	14:50	460
10/20/1976	15:30	399
11/03/1976	14:40	476
01/04/1977	08:00	817
02/08/1977	10:45	536
03/08/1977	10:20	308
04/06/1977	10:45	285
05/11/1977	10:00	470
06/08/1977	10:45	516
07/06/1977	10:30	522
08/03/1977	11:15	509
09/07/1977	11:00	847
11/03/1988	08:35	673
01/19/1989	12:50	1040
04/19/1989	11:40	150
10/19/1989	12:30	860
02/22/1990	08:00	690
04/18/1990	12:20	850
07/18/1990	10:40	364
10/22/1990	13:45	575

Sample Date	Sample Time	Hardness (mg/L)
01/29/1991	11:30	1120
04/23/1991	11:00	600
07/22/1991	09:30	346
10/22/1991	11:15	561
01/27/1992	10:00	672
04/20/1992	10:20	561
07/27/1992	11:00	265
10/28/1992	15:45	551
01/26/1993	08:45	771
04/27/1993	08:00	369
07/26/1993	11:00	293
10/25/1993	10:45	590
01/24/1994	12:15	555
04/25/1994	11:40	405
07/26/1994	11:35	306.2
10/24/1994	10:50	490
01/31/1995	10:15	630
04/24/1995	12:30	265
10/30/1995	10:35	505
01/23/1996	11:15	860
10/29/2003	08:45	630
01/14/2004	12:20	750
04/27/2004	12:15	540
07/21/2004	17:45	385
10/13/2004	16:50	580
01/18/2005	12:30	860
04/19/2005	16:40	600
07/19/2005	15:55	436
10/20/2005	16:35	480
01/24/2006	15:30	760
04/18/2006	10:25	310
10/18/2006	16:20	710
01/24/2007	12:10	1010
04/18/2007	16:55	460
10/17/2007	17:10	540
01/15/2008	16:35	840
04/23/2008	18:10	640
10/23/2008	16:40	610
02/18/2009	16:50	620
11/19/2009	14:00	620
02/25/2010	16:30	1040
11/17/2010	15:25	640
02/16/2011	16:30	820
Average		**535**
50th Percentile		**513**
20th Percentile		**348**